Southern Power & Industry

The Industrial and Power Journal of the South[illegible]outhwest

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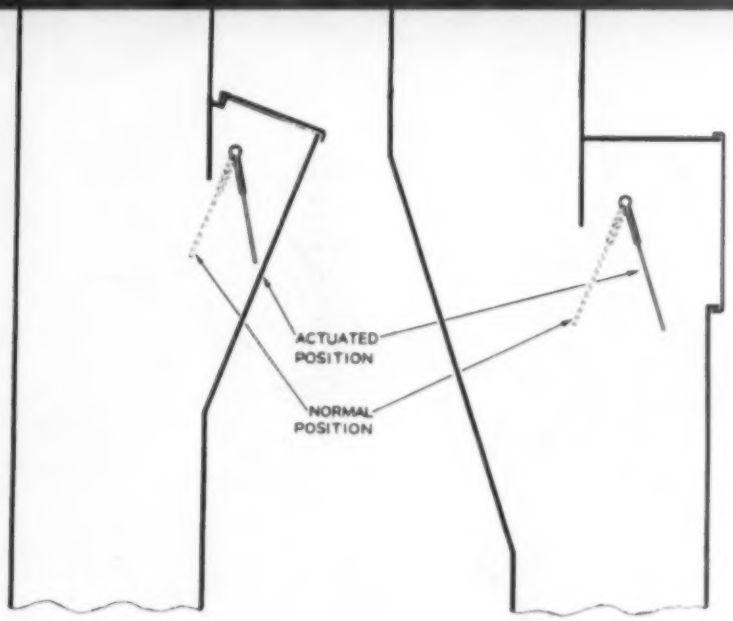
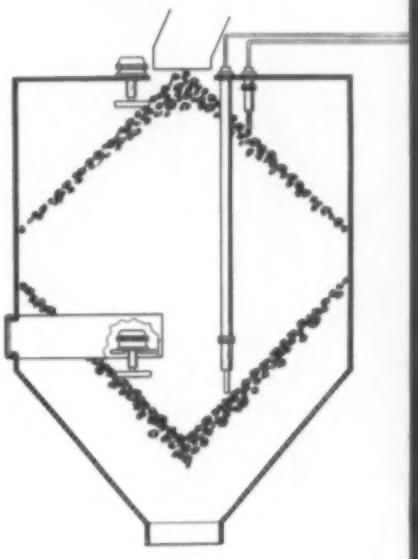
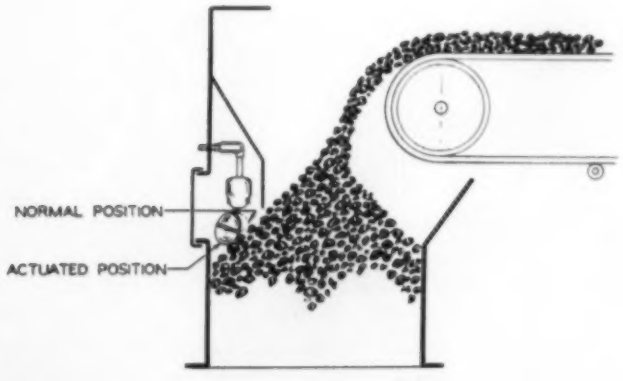
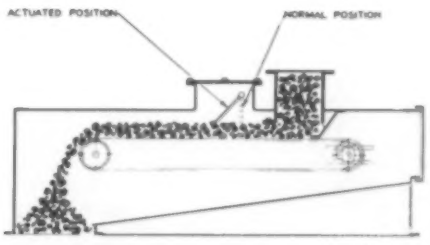


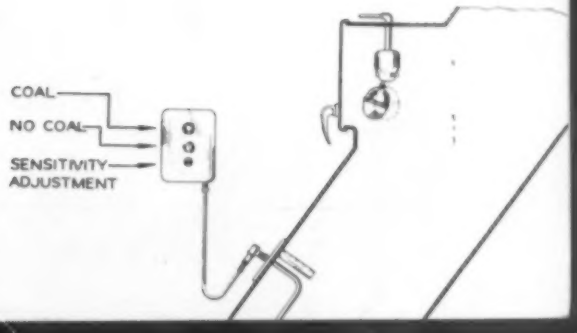






COAL HANDLING

report on level controls & stoppage alarms — 33



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1 ALUMINUM HEADER
for process piping

3 STAINLESS STEEL PRESSURE VESSEL
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SOUTHERN POWER & INDUSTRY is published monthly by W. R. C. Smith Publishing Co., Executive and Editorial Offices: 806 Peachtree St., N.E., Atlanta 8, Ga. Second-class postage paid at Charlotte, N. C. Subscription Rates: United States and Possessions, $1.50 per year or two years for $3.00; Foreign Countries, $10.00 per year.

Volume 77 Number 2

CLARAGE

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Southern Power & Industry

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SAN FRANCISCO: Fred Jameson, 821 Edinburgh St., San Mateo, Calif. Tel. Diamond 3-8806.

Subscription Rate: 1 Year — $1.50
2 Years — $3.00; Foreign — $10.00

Published monthly by
W. R. C. SMITH PUBLISHING CO.
Atlanta, Ga., and Charlotte, N. C.

Publishers also of *Textile Industries*, *Electrical South*, *Southern Hardware*, *Southern Automotive Journal*, and *Southern Building Supplies*.

W. J. Rooke, Chairman of the Board; R. P. Smith, President; E. W. O'Brien, Vice-President; A. E. C. Smith, Vice-President; J. C. Cook, Vice-President.

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No. 2

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Contents indexed regularly by Engineering Index, Inc.

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Address all correspondence to:
Editorial and Executive Offices: **SOUTHERN POWER & INDUSTRY, 806 PEACHTREE ST., N. E., ATLANTA 8, GA.** *Printed in U. S. A.*

Facts and Trends

February 2, 1959

◆ YOUR NEW WORKERS are not mind readers. "The Clerk in the Dark Blue Suit" (pages 30-31) is a short case study showing that in the every day routine of work, new workers and their special needs are easily overlooked. The induction of every new employee should follow a predetermined plan.

◆ WATER DOESN'T WEAR OUT. Many plants use it over and over again. In Lynchburg, Virginia, General Electric had a big problem in meeting the thirsty requirements of many manufacturing processes, air conditioning units, air compressors, welding equipment and other water consuming devices.

However, installation of a recirculating water supply system realized savings of over $30,000 per year and enables plant engineering personnel to statistically control the amount of new water entering the system.

◆ AS COAL HANDLING facilities and bunker to pulverizer equipment become increasingly automatic and dust-tight, it is imperative to install reliable coal level controls and coal stoppage alarms.

Pages 33-39 describe types of level and flow switches now available, proper application, typical installations, and a check list of operating difficulties.

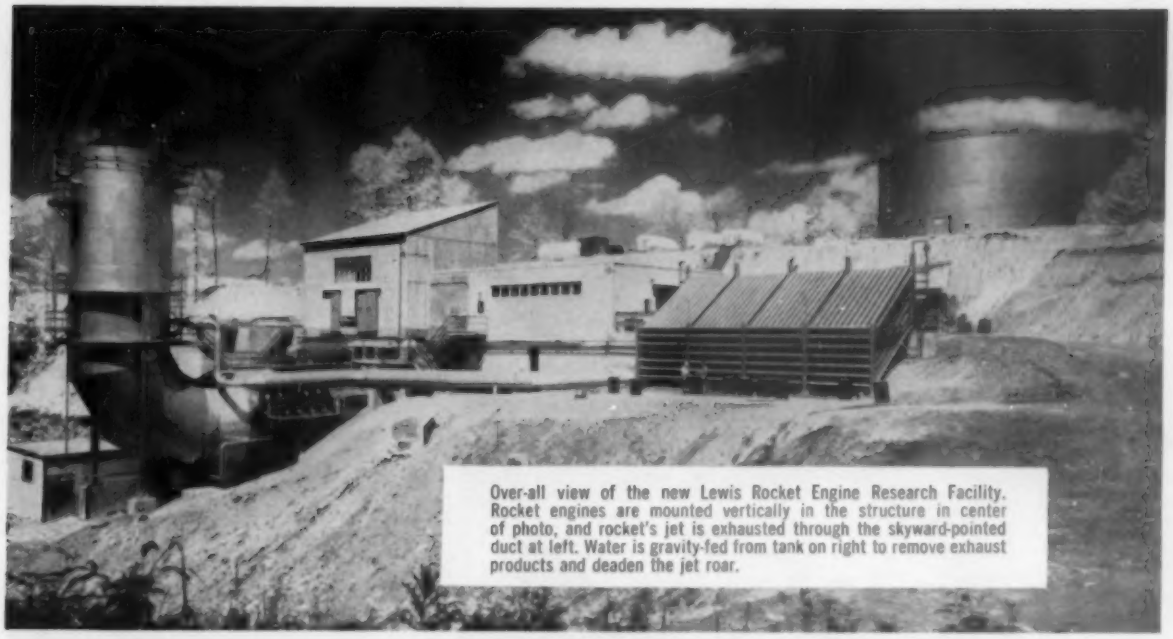
Reprints of "Coal Handling" are available — as long as our supply lasts — single copy requests of the 8-page reprint will be mailed at no charge to Southern & Southwestern engineering personnel.

◆ FUEL CELLS — Efforts have been made to cut the cost of electric power made from conventional fuels thru the use of fuel cells. Although not commercially available, experimental units are being developed which convert the heat of burning fuel directly into electrical energy by an electro-chemical process. They are beginning to meet the requirements of steady output.

Nothing can be said as yet about the ultimate economics of the fuel cell but development work carried out under the sponsorship of the U. S. Army Signal Corps is summarized in Bulletin No. 58-A-200, available at 80 cents from the Order Dept., ASME, 29 West 39th St., New York 18.

◆ ANTI-FREEZE SYSTEM installed on over 4,000 ft of steam and water lines in the 220,000 kw A. B. Paterson Station of New Orleans Public Service, Inc., is described on page 42.

Instead of the usual steam tracers or resistance cable, heat is supplied by a single No. 16 copper wire, mineral-insulated and sheathed in copper tubing. Automatically energized at 40 F ambient temperature, the conductor will maintain the pipe at 40 F even when the ambient temperature drops as low as 10 F. Extensive use of Silastic R-Tape prevents galvanic corrosion and permits rapid diffusion of conducted heat.



Over-all view of the new Lewis Rocket Engine Research Facility. Rocket engines are mounted vertically in the structure in center of photo, and rocket's jet is exhausted through the skyward-pointed duct at left. Water is gravity-fed from tank on right to remove exhaust products and deaden the jet roar.

Armco Retaining Wall Holds Back Slope at New Rocket Research Facility

At the new Lewis Rocket Engine Research Facility, a $2.5-million addition to the National Advisory Committee for Aeronautics Laboratory at Cleveland, an Armco Bin-Type Retaining Wall holds back a steep slope to gain ground for needed roadway space.

With the new facility, aeronautical scientists can use practical-size rocket engines in their research on new high-energy rocket propellants.

In the Laboratory, rocket engines are tested by mounting them vertically in a test stand with the jet directed down into a treatment duct. Within this duct, harmful exhaust products are removed and the engine roar silenced. A scrubber-silencer does this by spraying water at the rate of 50,000 gallons a minute. This volume of water is gravity-fed from a 450,000-gallon reservoir.

Because the entire installation is on a steep hillside, level areas had to be created for the road by cutting into the hill. Problem was to hold back the slope to provide room for a wide roadway at the base. How well an Armco Retaining Wall solved the problem can be seen in the photo at the right.

* * *

Armco Retaining Wall is only one of more than 30 Armco Products for a wide variety of highway, railway, municipal and industrial applications. These products are supplied by 55 Armco Plants and sold by hundreds of experienced Armco Sales Engineers. Use coupon for more data on Armco Walls. Armco Drainage & Metal Products, Inc., P. O. Box 1343, Atlanta, Georgia, or C & I Life Building, Houston, Texas. Other offices in principal cities.

This Armco Retaining Wall, at the base of the slope below the water reservoir, is 331 feet long with a nominal height of 8 feet. The Wall helps contain the slope and gain ground for needed roadway space.

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$35 Million Western Electric Co. Plant Underway in Oklahoma City

When completed in mid-1960, **Western Electric's** new 1,300,000 sq ft plant on a 210-acre site seven miles west of downtown **Oklahoma City,** Oklahoma, will produce dial switching equipment for telephone exchanges of the Bell Telephone System. On a multi-shift basis it will employ about 4,000 men and women.

About 360 are now employed in pilot operations in Oklahoma City, which were started a year ago to train workers for the permanent plant. Ground was broken in December. Grading and foundation work are scheduled to be finished by mid-1959. Structural steel will be in place and masonry work will be well along by the end of 1959.

Production is scheduled for mid-1960. The Oklahoma City plant will be one of three manufacturing and supply units making "crossbar" — a type of modern switching equipment that works on electro-mechanical principles.

Dickey Clay Builds Plants in Mo. & Ala.

Nearing completion in St. Louis, Mo. is the $300,000 plant addition and a $40,000 office building for **W. S. Dickey Clay Mfg. Co.** The 130′ x 157′ plant will be used for the manufacture of clay pipe and a complete line of fittings. The 2,000 sq ft office building will house general, sales, plant, and shipping offices as well as plant control laboratories.

During the summer Dickey plans to begin construction of a $4,250,000 clay products plant in Bessemer, Ala. which will require about one year to erect. Located on a 160 acre tract, the plant will have a rated capacity of 55,000 tons per year with provisions to increase to 80,000 tons annually when needed.

LP&L Generating Plant — New Orleans

A new steam-electric generating plant with a planned capability exceeding that of the present combined installed capacity of all other electric utility plants in the state — 2,000,000 kilowatts — will be constructed by **Louisiana Power & Light Company** near the Bonnett Carre Spillway. The plant will be on the upriver side of the spillway, in the St. Charles parish, approximately 23 miles from New Orleans.

The first unit will be designed so that either coal, gas or oil may be used as fuel; and it is scheduled for operation in 1961, having a capacity of 230,000 kilowatts.

The plant will represent a major addition to the generating facilities of the Middle South Utilities System of which Louisiana Power & Light Company is a part. Other companies comprising the Middle South System are Arkansas Power & Light Company, Mississippi Power & Light Company, and New Orleans Public Service Inc. It will be interconnected with the System through a new high voltage transmission network designed for operation at 230,000 volts.

Georgia Plant for New York Rubber

The New York Rubber Corporation, manufacturer of conveyor belts and other industrial rubber goods, has purchased a new 70,000 sq ft plant in **Swainsboro, Georgia.** Plant will be used for the fabrication of inflatable rubber life rafts and other inflatable rubber products.

The new plant in Swainsboro was built in 1957. Considerable modification work will be done to the building, including the installation of modern lighting and ventilating equipment. Initial employment is estimated around 100.

Conoco Expanding Oklahoma Plant

An expansion and modernization program at **Continental Oil Company's** oil products compounding and packaging plant in Ponca City, Okla., which will cost approximately

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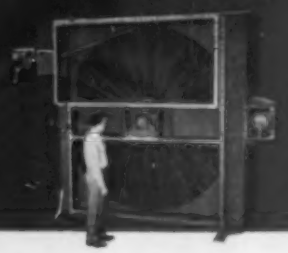


By recovering heat from the exhaust gas, the Ljungstrom Air Preheater can increase combustion temperature as much as 400° or more! By raising furnace temperature this way, you permit more heat to be absorbed into boiler tubes or heat transfer surfaces. The results are increased capacity and greater output from every fuel dollar you spend.

And when you credit fuel savings, the installed cost of a Package Ljungstrom can be paid for in approximately two years.

You get maximum heat recovery because the Ljungstrom's exclusive rotary heat transfer element puts the heat back directly into the combustion air, i.e. without passing it through heat-absorbing partitions or tube walls. Package design also gives you all the advantages and economies of the Ljungstrom in a compact, pre-assembled unit. Available in vertical or horizontal models, Package Ljungstroms are readily adaptable to any plant arrangement.

For further information, write today for the free 14-page Package Ljungstrom manual.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

three quarters of a million dollars, is getting underway with completion expected by fall, 1959.

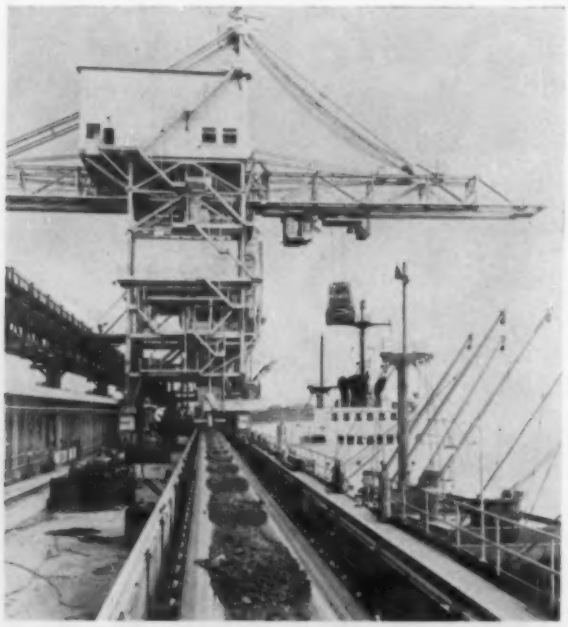
Plans include construction of a modern warehouse adjacent to the compounding and packaging plant. It will provide an additional 34,000 sq ft. The present plant contains 56,000 sq ft.

The new warehouse will be primarily of brick construction. It will feature docks for loading and handling packages in both trucks and railroad cars.

As part of the program, a new automatic blender and homogenizer will be installed at the plant, which will permit the automatic blending of the exact proportions of various ingredients in lubricating oils.

Reichhold Plant for Houston

Underway on a 20 acre site in Houston, Tex. is a million dollar plant for the production of synthetic resins for **Reichhold Chemicals, Inc.** The plant is scheduled for completion by mid-1959 and will be under



$15 Million Deep Water Terminal — Louisiana

Burnside, Louisiana — The Bulk Marine Terminal, the largest publicly owned facility of its type in the Gulf Coast area, is now in operation. The $15 million terminal, located on the Mississippi 30 miles below Baton Rouge, will be able to handle up to 4,800 tons of material an hour.

Bauxite — aluminum's basic ore — is being unloaded from a ship and transported by an extensive conveyor system to the adjacent **Ormet Corporation** plant where it is processed into alumina. Ormet Corporation, the nation's fourth primary aluminum producer, is jointly owned by Olin Mathieson Chemical Corporation and Revere Copper and Brass Incorporated.

The 738-ft long conveyor feeds to two gantry crane unloaders. The terminal's entire conveyor system totals one mile in length.

The Burnside Bulk Marine Terminal is leased to Olin Mathieson by the Greater Baton Rouge Port Commission.

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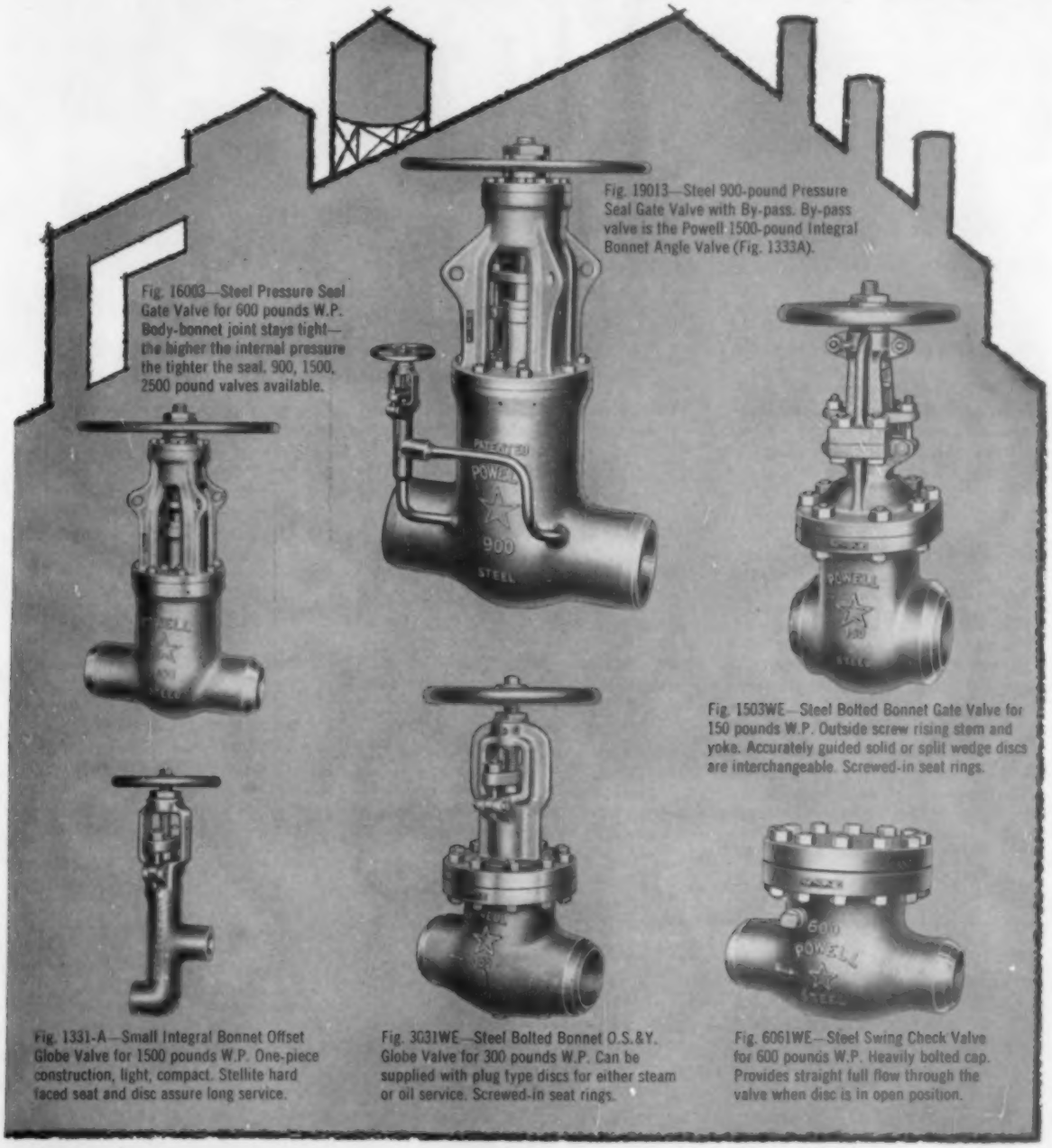

Fig. 19013—Steel 900-pound Pressure Seal Gate Valve with By-pass. By-pass valve is the Powell 1500-pound Integral Bonnet Angle Valve (Fig. 1333A).

Fig. 16013—Steel Pressure Seal Gate Valve for 600 pounds W.P. Body-bonnet joint stays tight—the higher the internal pressure the tighter the seal. 900, 1500, 2500 pound valves available.

Fig. 1503WE—Steel Bolted Bonnet Gate Valve for 150 pounds W.P. Outside screw rising stem and yoke. Accurately guided solid or split wedge discs are interchangeable. Screwed-in seat rings.

Fig. 1331-A—Small Integral Bonnet Offset Globe Valve for 1500 pounds W.P. One-piece construction, light, compact. Stellite hard faced seat and disc assure long service.

Fig. 3031WE—Steel Bolted Bonnet O.S.&Y. Globe Valve for 300 pounds W.P. Can be supplied with plug type discs for either steam or oil service. Screwed-in seat rings.

Fig. 6061WE—Steel Swing Check Valve for 600 pounds W.P. Heavily bolted cap. Provides straight full flow through the valve when disc is in open position.

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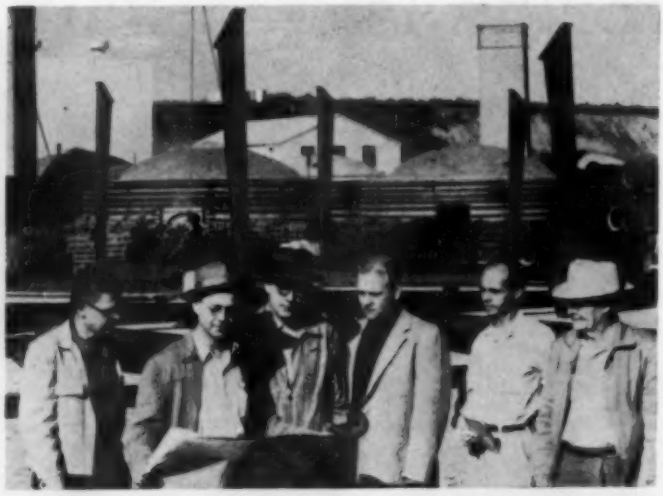
the managership of **Don Leever**, currently the company's division director of technical service at Kansas City.

The new factory will produce a full line of RCI resins, including alkyds, polyesters and emulsions, for use in the paint, aircraft, petroleum, boat and housing industries in the Houston area.

$1 Million Big M Plant for Miss.

Construction is underway in Batesville, Mississippi on the $1,000,000 project for **Big M Metal Products Co.** Three contracts have been let at a cost of $863,686 for general construction, electrical work and mechanical contracting.

Completion of the project is anticipated by late summer.



Mineral Wells, Texas — Construction work was started recently for another plant addition at the **Texas Vitrified Pipe Company.** The new building, which is the second to be added by the firm in the past year, will be used for production of a new factory-cast polyester clay pipe joint. Pictured during an inspection of the project are, **T. D. Ward,** Tex-Vit research engineer; **Luther Waddy,** chief engineer; **R. L. Blessing,** production manager; **Don T. Kearby,** assistant sales manager, and **R. W. and W. W. Brassell,** construction contractors.

UNION CARBIDE TO OPERATE 3rd TEXAS UNIT

Union Carbide Corporation has exercised its option to purchase from Amoco Chemicals Corporation the utilizable facilities which remain on the 306 acre tract at **Brownsville, Texas.**

The project was originally designed and built by Carthage Hydrocol, Inc. to produce synthetic gasoline, other petroleum fractions and coproduct chemicals from natural gas by the Fisher-Tropsch process. It was acquired by Amoco Chemicals Corporation in 1954 and operated by Amoco until last Fall.

Union Carbide is not contemplating the production of either synthetic gasoline or petroleum products, nor does it intend to produce chemicals by the Fisher-Tropsch process. Engineering studies are being made for additions and revisions at the site. Utilization of these facilities will be deferred for this reason and also will depend upon completion of satisfactory arrangements for fuel gas and raw material supply.

Coal Handling . . .

AS COAL HANDLING facilities and bunker to pulverizer equipment become increasingly automatic and dust-tight, it is imperative to install reliable coal level controls and coal stoppage alarms. SPI's feature 8-page report (33-39) describes types of level and flow switches now available, proper application, typical instal. .tions and operating difficulties.

Free reprints of this 8-page report are available to Southern and Southwestern engineering personnel. As long as our supply lasts, single copy reprints will be mailed — use your **Reader Service Card on page 73.**

Aircraft Armaments — Expansion in Md.

Underway for **Aircraft Armaments, Inc.** of Cockeysville, Md. is a 14,000 sq ft addition to the east side of its plant and a 42,000 sq ft addition to the west side of the building.

The company's parent organization, United Industrial Corp. has purchased an adjoining 57 acres tract which will be used for Aircraft Armaments' future growth. Within the next two years a 60,000 sq ft engineering and administrative office building will be erected on this property.

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$3.5 Million Okla. Plant for Sun Oil

Construction is underway on a large natural gas processing plant on a 40 acre tract in Laverne, Okla. **Sun Oil Company** will be the operator for itself and 11 other companies.

The J. F. Pritchard Company of Kansas City, Mo., has been selected as contractor for the plant, which will cost about 3½ million dollars. Completion is to be on or before July 12, 1959.

Initially, the plant will process 100 million cu ft of gas per day and may expand to 150 million cu ft later. It will be the first of its type in the country to use gas-fired turbines for generating power and process heat.

Sun Oil Company's Southwest Production Division Gas Department will supervise construction and operate the plant for Sun's Mid-Continent Production Division, in whose area it will be located. **J. P. Hendrix** will be plant superintendent and will supervise construction for Sun. **C. D. Herron** will be chief clerk.

Hoerner Plants for Miss. & Mo.

Hoerner Boxes, Inc., has announced plans to build sheet plants at Tupelo, Mississippi and Springfield, Missouri in 1959.

The buildings will be identical in design, and occupy approximately 40,000 sq ft of space. Construction has begun at Tupelo, and the plant is expected to be in operation by early summer.

Manager of the Tupelo, Mississippi plant will be **Forrest R. Hamilton.** He has been a packaging engineer with Hoerner Boxes since 1956, and at present works out of their Little Rock, Arkansas plant.

Bluefield, Virginia — The new $250,000 15 ton/hr pulverized limestone plant of **Limestone Dust Corp.** is now supplying coal mines with rock dusting material. **J. J. Brown, Jr.** is vice president and general manager and **Garland A. Hess** is plant superintendent.

Bedford, Virginia — $250,000, 46,000 sq ft office-factory of **Moore of Bedford, Inc.,** is scheduled for April-May completion. Venable Construction Co. is the general contractor. Expanded plant will assemble, finish and upholster chairs and other furniture lines.

Chamblee, Georgia — $500,000 addition is planned for the **United States Envelope Company's** Atlanta Division.

Roanoke, Virginia — **Johnson-Carper Furniture Co.** is constructing a new 135,000 sq ft, three-story warehouse addition with completion scheduled for May. Company manufactures the Fashion Trend line of furniture.

Jackson, Mississippi — A new 17,000 sq ft branch plant for its Power Piping & Sprinkler Division is being constructed by **Blaw-Knox Company.**

Big Island, Virginia — A modernization program for **Owens-Illinois Glass Company's** Mill Division will add a 170-in., high speed paper machine at the company's pulp and paper mill. Daniel Construction Company has the modernization contract with completion scheduled for September, 1959.

Greenwood, Mississippi — A new 60,000 sq ft, 85 employee plant will be established by **The Art Publishing Company** for the manufacture of wooden picture frames.

St. Louis, Missouri — A new 17 acre site for expansion of concrete pipe manufacturing facilities has been acquired by the **American Vitrified Products Company.**

Albany, Georgia — Sutherland Paper Company is building a 175,000 sq ft, $1,500,000 converting plant. Initial production will be the manufacture of paper cups, paper plates, pre-packing meat and produce trays. Production of paraffine and folding dry cartons is expected at a later date.

PLANT PERSONNEL

A. W. Hogeland, formerly design engineer in the central engineering department in Philadelphia, is now assistant chief plant engineer at American Viscose Corporation's Fredericksburg, Virginia cellophane plant.

Victor M. Morgan is now plant engineer of the Columbia, Tennessee plant of the Phosphorus Division, Hooker Chemical Corporation. Mr. Morgan succeeded **Theodore T. Garrett,** recently promoted to works manager of the Columbian plant.

James R. Pagans has been transferred to American Viscose Corporation's rayon plant in Front Royal, Virginia and assigned to the Industrial Engineering Department as a method and time study analyst. **A. G. McVay** is plant manager at Front Royal.

Philip E. Sharr is barium project manager for the barium chemicals plant at South Charleston, West Virginia, which is operated by Columbia-Southern Chemical Corporation.

John L. Tullis has been elevated to president and general manager of The J. B. Beaird Company, Inc., Shreveport, Louisiana manufacturer of heavy steel products. Mr. Tullis, who has been executive vice president, succeeds **J. Pat Beaird** who resigned in order to devote full time to outside interests.

Joseph H. Girdler is manager of the Huntington, West Virginia Works of Connors Steel Division of the H. K. Porter Company, Inc. Prior to joining Connors, Girdler was vice president of operations for Atlantic Steel Company in Atlanta, Georgia.

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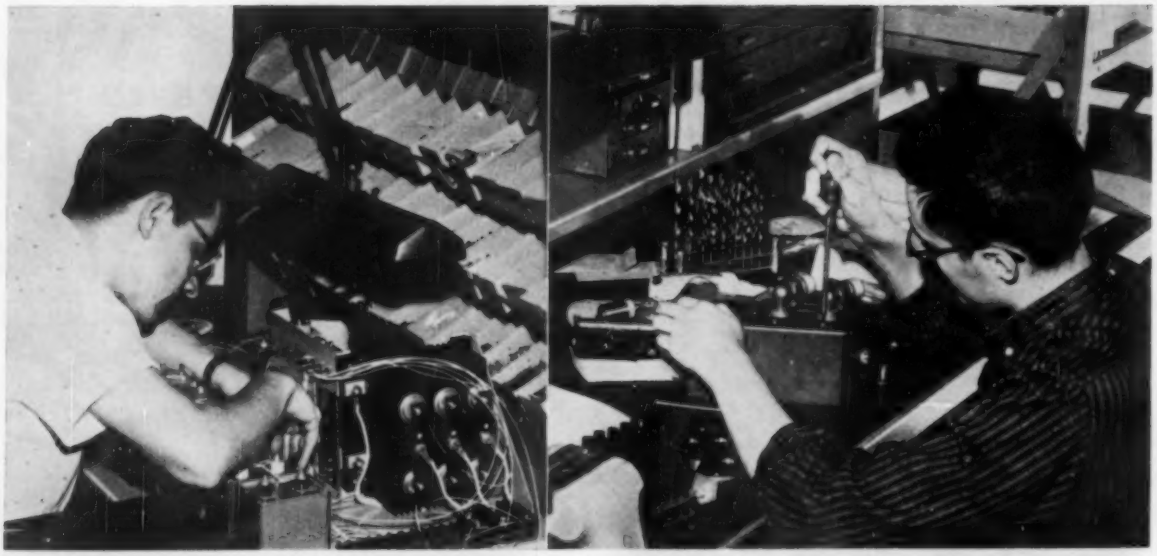

Waynesboro, Virginia . . .

TRAINING for a New Plant

By H. M. HOWELL
Mr. Howell is a Specialist — Employee Relations,
Specialty Control Dept., General Electric Co., Waynesboro, Virginia

AN IMPORTANT source of manufacturing "know how" in the General Electric Co. has been the Apprentice Courses offered at the larger company plants. Many important operating positions in the company are held by graduates of these courses.

Therefore, with the move of the Specialty Control Department from Schnectady, N. Y. to Waynesboro, Va. (SPI for December, pp 38-40) and the training of its factory workers (SPI for January, pp 18-22), a careful study was made of the future needs of the Department for jobs on which training equal to that of the Apprentice Course would be desirable. Considering allowances for expansion of the business, the need for replacement, loss of those who would leave the Company, and loss of those who would fail to meet the course requirements, it was decided that between four and six men per year would be needed.

It seemed apparent that most Apprentice Course graduates at the larger plants would be in heavy demand and would be employed there. We, therefore, started our own Apprentice Training Program, in March, 1956. The primary purpose of this program was to train and develop interested and qualified young men to become skilled machinists or toolmakers. Once having acquired these skills, an individual would be in a position to increase his potential for more responsible work.

Our Apprentice Program candidates must be 18 to 25 years of age and must have satisfactorily completed courses in elementary and intermediate algebra, plane geometry, physics, and trigonometry. They are given a series of aptitude tests (for general ability, space perception, mechanical comprehension, and interests) before being interviewed.

The course covers 6800 hours of shop work divided into 8 periods of 850 hours each and a minimum of 700 hours of evening classroom study. Since the normal work week is 40 hours, apprentices will complete the program in 3½ years. The University of Virginia Extension Division conducts seven of the classroom courses and offers college credit in them toward an engineering degree. With this high-standard, college-level curriculum, graduates of our Apprentice Program have the groundwork for still further education. The University of Virginia courses offered are college algebra, mechanical drawing I and II, analytical geometry, calculus, chemistry, and physics. In addition, Specialty Control instructors teach motion-time-survey, and shop practices.

The 6800 hours of shop work,

or 170 weeks, consists of a trial period of three months in the tool room; then a series of planned rotating assignments throughout the department for 100 weeks; followed by a final training period of 58 weeks in the tool room.

Progress rating sheets are made out for each apprentice once a month for the first year and at the end of each assignment for the balance of his apprenticeship. These ratings are discussed with the apprentice.

There are now two groups of apprentices in training; the first group of five, which started in 1956, and the second group of four, which started in 1957. Since none have as yet completed the program, it is not possible to evaluate its effectiveness. However, we are confident that with the high standards established for both shop work and classroom work, it will provide qualified employees to fill our future needs for skilled manufacturing jobs.

FOLLOW-UP training procedures for G-E factory workers at the new Virginia Specialty Control Plant — the apprentice program — under what conditions special group training programs should be undertaken and at what point they should be discontinued.

When to Train

One of the many difficult decisions faced by managers is whether, or at what point, and under what conditions, special group training is economically sound. Take, for example, the group we used for draftsmen and for wiring — assemblers. Under what circumstances should such programs be undertaken and at what point should they be discontinued?

During or just prior to a period of anticipated heavy business growth, the question naturally arises whether to maintain formal training courses or to train as needed. There is considerable advantage in constantly preparing a supply of trained people within the business in anticipation of growth. But whether this should be done depends on the length of that contemplated period of growth, on how rapid it will be, and the difficulty in attracting people from outside the business when they are needed. Such training is an expense load and has to be justified by the existing and the projected business situation.

A strong argument in favor of it is that in the absence of some kind of "pool" of trained employees, individual supervisors tend to wait and try to fill skilled openings as they occur, rather than making long-range preparation by training. These supervisors have operating budgets, and generally speaking, they either are not in a position to have the foresight to visualize their future needs, or else they do not feel they have authority to spend money and time preparing to meet them. In short, individual supervisors generally do not train in advance to meet their requirements.

The decision to do so is best made by someone who is in a position to see the whole picture and to take the responsibility for incurring the necessary expense. If this is not done when the situation requires it, then during a time of considerable skill scarcity, the ranks cannot be filled with sufficient rapidity to meet the requirements, and frantic and expensive recruiting results.

On the other hand, it is not economically feasible to use group training methods if new job openings are relatively few and infrequent and can be filled by occasional hiring.

The major advantages and benefits from formalized training programs come about when there is an intensive and extended initial hiring period, or a period of planned and extensive expansion, during which the normal labor market cannot supply a sufficient number of candidates at the required rate. In situations less drastic than this, the cost of training can become too prohibitive for the realization of short run business objectives.

Special Problems

Are women harder to train for factory work than men? We think not, in fact there are certain types of light assembly work requiring hand and finger dexterity, which women seem to learn more quickly than men. About half of our factory employees are women and most of them are assigned either to light assembly and wiring work, or to the operation of smaller machines.

The principal problem in training women was not that they took longer to learn than men, but that most of them had had no industrial experience before coming with us and, therefore, lacked basic understanding of mechanical relationships and the use of tools. This lack of mechanical experience and familiarity had to be recognized and corrected in the early stages of training.

Conclusions

It is very difficult to draw general conclusions from the experience of one business as it transfers its operations from one location to another. So many of the choices that have to be made are related to special circumstances, regarding time and place, that the effectiveness of any one decision or group of decisions is difficult to measure. Only the total result is measurable and if this total result is good, about all we can say is that good decisions have outnumbered the bad ones — or at least the good ones were the important ones. Since the problems of training are only some of the many problems of a business transfer, we cannot say to what extent our own successful move was due

to the ability to solve them. There are, however, certain things to bear in mind for those considering a major physical relocation such as ours:

1. Training is simply a matter of economics. True, there are also some indirect community relation benefits; but fundamentally, we train people, not for training's own sake, but in order to get work done quickly and efficiently — for optimum results. Therefore, we don't want to go any further than is required for the soundest possible mixture of short and long term business objectives.

It is, therefore, usually necessary to be selective in determining where to spend the available training time and money — both of which we can assume will be limited. Not only is it necessary to select which training methods to use for which kinds of work, but once a training program has started, it will be necessary to determine how far to go in time — how long it should be carried on before the point of diminishing returns is reached.

there is always a BETTER WAY see page 86

The dollars and hours spent on training are the same as any other dollars and hours — they have a multitude of other possible business uses. We cannot afford to stint on training, yet we must always be alert to the best possible use of our human and financial resources.

2. Training people is a custom kind of job. Whatever is done must be tailored to the situation, and to conditions in the particular labor-market community. It may be that the required skills will not even exist in or near the community at any price, and it may be necessary to train from scratch. If skills do exist in the community, they may exist only in the plants of community neighbors. In this case, management will have to decide whether to acquire skills by extensive training, or by taking them from these new industrial neighbors, and thereby risking loss of their friendship. This last decision may also involve appraisal of the adequacy of the existing pay rate structure in the community and what the rate structure for the new plant should be.

If the community is growing industrially, it must be recognized that some of the money spent in training people will be lost in normal competitive turn-over; that is, you may develop a machinist and lose him later to a new industrial neighbor moving in. However, some part of this training money can be treated as investment, since you are contributing to the industrial skills of the community; and if your rates of pay are competitive, the turnover will work both ways.

3. In terms of business results — the desired end product — **training is inseparable from selection.** The better the raw material, the better the finished product. People of character, intelligence, and skill potential can be motivated and trained to give desired results — results which will be mutually rewarding both to them, and to the business which provides their employment.

4. When a manufacturing business is moving to a new community where most of the required skills are not readily available, **all supervisors have to be trainers.** Even those transferred as industrial specialists may be called on to train from time to time, though on their normal work assignments they may have no people reporting directly to them. Trainers must be teachers. Teachers must have both the "know-how" and the ability to impart it to others. This means that in selecting supervisors for a business making this type of move, the ability to teach — always of importance in supervision — is of even greater importance than usual.

FUTURE EVENTS of Engineering Interest

Mar. 1-3: Southern Safety Conference & Exposition. Battery Park and George Vanderbilt Hotels, Asheville, N. C. W. L. Groth, Exec. Dir., Southern Safety Conference, Box 8927, Richmond 25, Va.

Mar. 8-11: Gas Turbine Meeting. American Society of Mechanical Engineers, Cincinnati, Ohio. L. S. Dennegar, Dir. of Pub. Rel., ASME, 29 West 39th St., New York 18, N. Y.

Mar. 18-20: 22nd Annual Short Course for Superintendents & Operators of Water & Sewerage Systems. Louisiana State University, Baton Rouge, La. F. H. Fenn, Dean, College of Engrg. and Dir., Engrg. Experiment Sta., La. State Univ., Baton Rouge 3, La.

Mar. 31-Apr. 2: 21st American Power Conference. Hotel Sherman, Chicago, Ill. R. A. Budenholzer, Mech. Engrg. Dept., Illinois Institute of Technology, 3300 Federal St., Chicago 16, Ill.

Apr. 2-3: Annual Conference on Electrical Application in the Textile Industry: American Institute of Electrical Engineers; Heart of Atlanta Motel, Atlanta, Ga. J. W. Ward, EE, Avondale Mills, Sylacauga, Ala.

June 1-5: 5th World Petroleum Congress Exposition. Coliseum, New York, N. Y. E. K. Stevens, Exposition Mgr., International Exposition Co., 480 Lexington Ave., New York 17, N. Y.

June 9-11: Material Handling Institute's Exposition. Public Auditorium, Cleveland, Ohio. W. L. Redding, Hanson & Shea, Inc., One Gateway Center, Pittsburgh 22, Pa.

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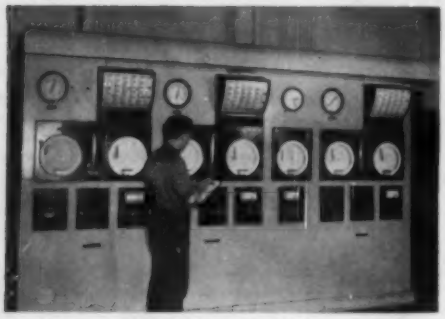
Shown are two of the three Keeler boilers— fired by Detroit Spreader Stokers— in the power plant. At the right is the 22,000 lb/hr boiler. In the background is one of the 50,000 lb/hr boilers. The two sizes allow flexibility in operation for widely varying load requirements.



Control panel by Hays Corporation. This system regulates all operations of the boilers—steam pressure, draft, flue gas temperature, banking periods etc.—to give complete, automatic control of steam generating operation.

Ash disposal system, by United Conveyor Co., in basement of boiler room. Ash is removed from furnace by Detroit CC grate, and is taken by vacuum to silo.

Telephone manufacturer calls for coal

Automatic Electric Co. burns coal in new plant because of cost and availability

Modern facilities, modern products, modern fuel—you'll find all three at the new Northlake, Ill., plant of Automatic Electric Co., manufacturing subsidiary of General Telephone. The power house of this communications equipment plant (designed and built by The Austin Company of Cleveland) is as modern and efficient as the manufacturing process itself. The plant required large quantities of economically and reliably produced steam for process work and heating. The fuel selected was *coal*, because of coal's economy and abundant supply. As a result, today Automatic Electric enjoys dependable, low-cost steam.

Coal is lowest-cost fuel

Today, when the annual cost of fuel often equals the original cost of the boilers, you should know that bituminous coal is the lowest-cost fuel in most industrial areas. And modern coal-burning equipment gives you 15% to 50% *more* steam per dollar, while automatic operation trims labor costs and eliminates smoke problems. What's more, tremendous coal reserves and mechanized mining procedures assure you a constantly plentiful supply of coal at stable prices.

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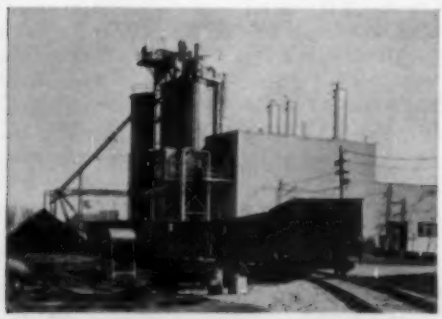

Exterior view of Automatic Electric power plant. Coal drops into track hoppers; then Stephens-Adamson conveyors move it up into coal silos. Silos have 5-carload capacity.

SEND COUPON FOR NEW "Guide Specifications for Underfeed Stoker Fired Low-Pressure Heating Plants." Heavy demand for the first edition of this booklet, adaptable for design loads 3,000 to 26,000 EDR steam, has justified an expanded edition covering application of underfeed stokers to firetube, watertube and sectional cast iron boilers. Complete specifications criteria cover all aspects of typical heating plant.

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INDUSTRY SPEAKS

DR. CLARENCE H. LORIG, president of the American Society for Metals, and technical director of Battelle Memorial Institute, in a year-end report, highlighted metallurgical achievements in 1958 and predicted even more amazing strides for 1959.

New Horizons in Metallurgy

GENERATION of heat hotter than the sun, the perfection of two new steels, one with the highest tensile strength of any metal on record, and a new explosive forming technique for shaping metal . . . These and other metals developments prompt Dr. Lorig to observe that "we are on the threshold of even greater achievements in meeting space age demands."

Liquid fuels used in missiles are so cold (they approach absolute zero) that they affect the ductility of metal. These temperatures range from —346 to —434 F.

On the opposite temperature scale and proving effective in melting and applying metals and compounds having extremely high melting points is a new device, the "plasma-jet" which passes high velocity inert gases through an electric arc to develop upwards of 30,000 F, three times hotter than the sun. Tungsten, tantalum, columbium and other refractory metals are easily melted by this heat to build shapes on mandrels or coat surfaces of other materials that must withstand high heat. The answer to re-entry from outer space may be here.

New Steels

One new steel is an air cooling, ultra-high strength alloy for sheet forms with tensile strengths up to 280,000 psi. Another, hardly out of the laboratory, has shown strengths to 400,000 psi. It is reported also to have high ductility down to —385 F.

New Methods

Perfected this past year, "explosive forming" or "high energy rate" metal forming takes advantage of the little understood phenomenon in metals whereby a viscous state is created through great and rapidly applied pressures obtained from dynamite or TNT. Complicated shapes can be produced by this revolutionary method in a fraction of a second and in some cases without dies. A new machine developing extremely high pressures and releasing them instantly with a force comparable to a dynamite explosion is currently attracting attention. This compact new machine can turn out parts now requiring very large presses.

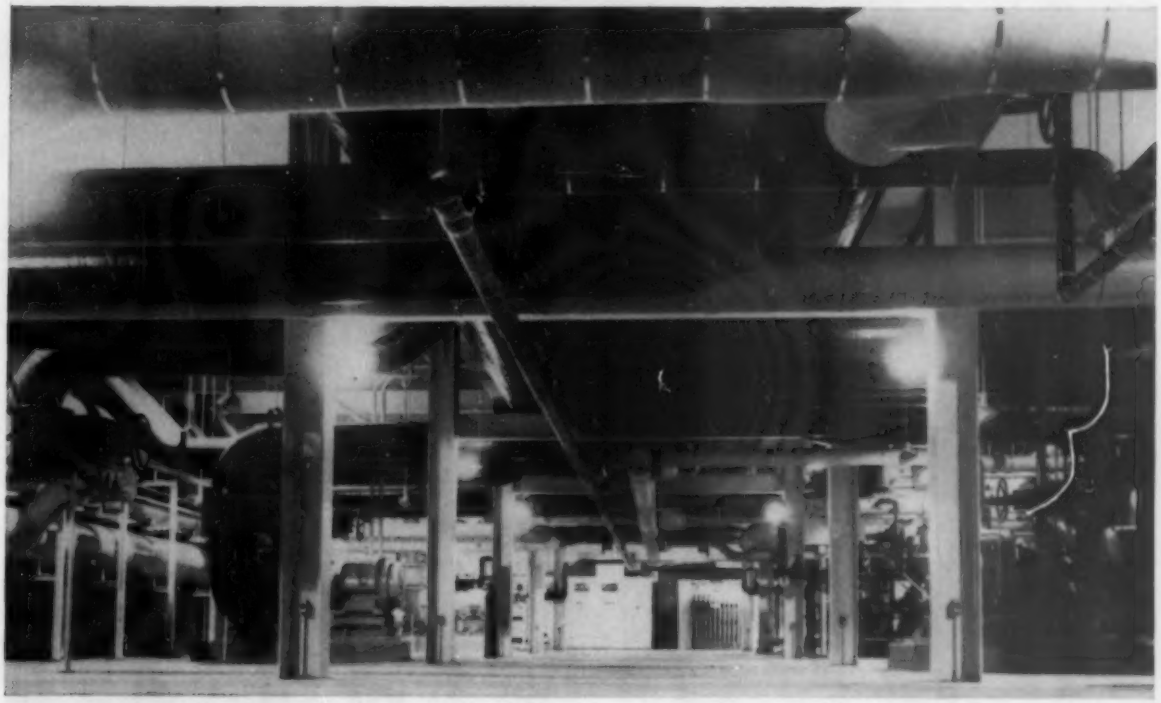
Metal powders have been advanced in two areas. One is the production of parts from a new low-alloy iron powder having strengths up to 190,000 pounds per square inch. The other is the making of metal strip directly from metal powders.

Something out of "Buck Rogers" is electron beam vacuum melting. Raw metal is fed into a vacuum chamber and melted by means of an intense beam from an electron gun. The process is now producing metals of extreme purity.

Titanium is arousing new interest with the introduction of three new alloys one of which, an all-beta alloy, can be heat treated to a strength of 240,000 psi. Because of its strength, lightness, formability and weldability the new alloy is expected to find widespread applications in aircraft and missiles.

Less spectacular, is the use in many 1959 automobiles of steel mufflers and other parts that have been protected from corrosion by aluminum coatings. Ceramics are used also to protect steel parts from corrosive actions.

The face of a commercial center



Architects and Engineers: Lane, Gamble and Associates; General Contractors: Robert E. McKee, Inc., and J. E. Morgan and Sons; Heating and Plumbing Contractors: Kieffer Plumbing and Heating Co., and Sam P. Wallace and Co.; Mechanical Engineers: Blum and Guerrero, and William K. Hall and Co.

. . . and its heart

THIS IS EXCHANGE PARK IN DALLAS, TEXAS—a 125-million dollar commercial development of five multi-story office buildings, a regional shopping center, a hotel and a complete medical center.

Over 300 tons of USS National Seamless Pipe in sizes from 2⅜" through 24" were used in the heating and cooling system which serves the center from a utility plant. Steam at 250 psi working pressure is generated in the utility plant by five 50,000-pound boilers whose combined steam capacity is 250,000 pounds. This plant also has a refrigeration capacity of 12,000 tons, supplied by a system capable of handling close to 34,000 gallons of condenser water per minute, and is capable of meeting the needs of a city with 36,000 people.

Do you need quality pipe for power, heating and air-conditioning installations? You'll get it when you ask for "NATIONAL PIPE." If you'd like further information or immediate assistance with your pipe problems, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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"The world's largest and most experienced manufacturer of tubular products"

Georgia paper mill resurfaces $5,300 kiln rolls . . .

Welder Pays for Itself on First Job

A PAIR of worn-out kiln rolls at Brunswick Pulp & Paper Company in Brunswick, Georgia, were rebuilt with a newly purchased semi-automatic submerged arc welder. They saved the cost of the welder plus an added $1,700 on the one job.

New kiln rolls are 3 ft in diameter and 1½ ft wide. By the time they were ready to rebuild, the rolls had worn down more than 4-in. on the diameter. The actual amount of metal required to rebuild the rolls to size was a little over 2 cu ft or about 1250 lb. Replacement cost of the two rolls would have been about $5,300.

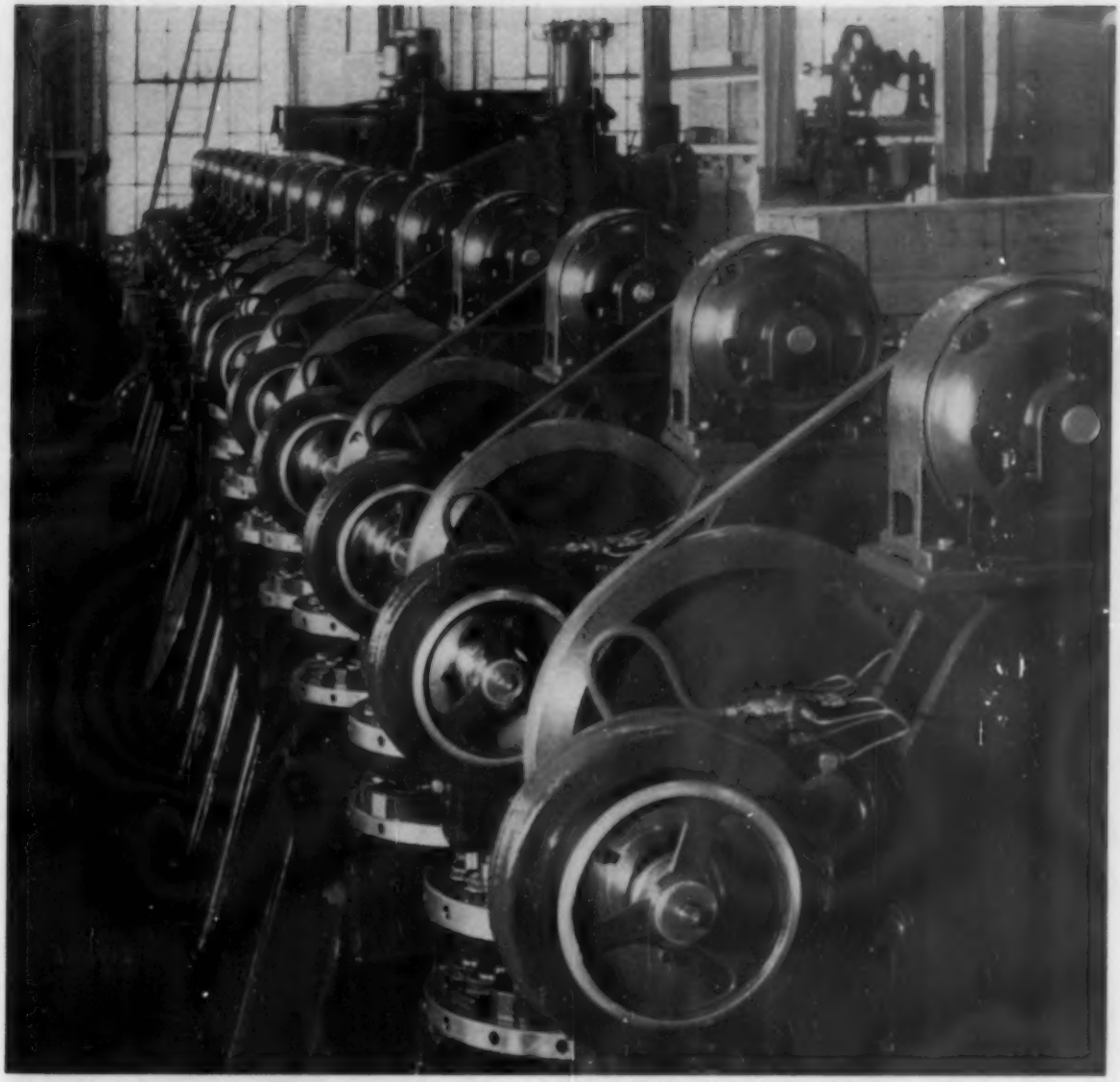
The company purchased a Manual Lincolnweld, ML-2, submerged arc welder and a 600 amp Lincoln motor-generator power source. They used a lathe that they already had to position and rotate the rolls. The welding cone of the welder was mounted on a hinged support, so that it could be easily moved to make and break the arc and properly position it over the work. The support was attached to the lead screw to provide travel of the cone over the work.

A sheet metal ring around either end of the roll supported the flux and molten metal on the beads on the edges. A metal pan with a coarse screen over it collected excess flux under the roll. This flux was reused. The screen caught the fused flux.

The welding procedure deposited metal at an overall rate of 17 lb/hr. Brunswick used 3/32-in. mild steel electrode with 500 amp welding current and 30-in. per minute travel speed. The bead spiralled around the roll. A feed of ⅝-in. per revolution overlapped adjacent beads, so that the surface was quite smooth. The operator deposited an entire layer without stopping. Beads on the edges were made without feed, and were started in a different place for each layer, so that uniform build-up resulted.

After the face of the roll was restored to size, the bearing journal on the shaft was built-up using much the same procedure. A total of 1270 lb of weld metal were deposited on each roll. A rough

(*Continued on Page* 44)



Higher speeds . . . higher efficiency . . . higher replacement cost

There was a time when a new gear or an odd part for machinery cost little more than the price of a few gallons of lubricating oil . . . but those days are gone forever. Today's power machinery is built for high speeds and higher efficiency. Parts are precision made, and replacements are sometimes prohibitively expensive.

The correct lubricant at the proper point in dependable form is a simple necessity in today's power machinery. The Standard Oil Company has made the servicing and supplying of such lubrication its business for over 70 years. The *first place popularity* of Standard Oil lubricants in the southern power industry has proved their dependable performance beyond doubt.

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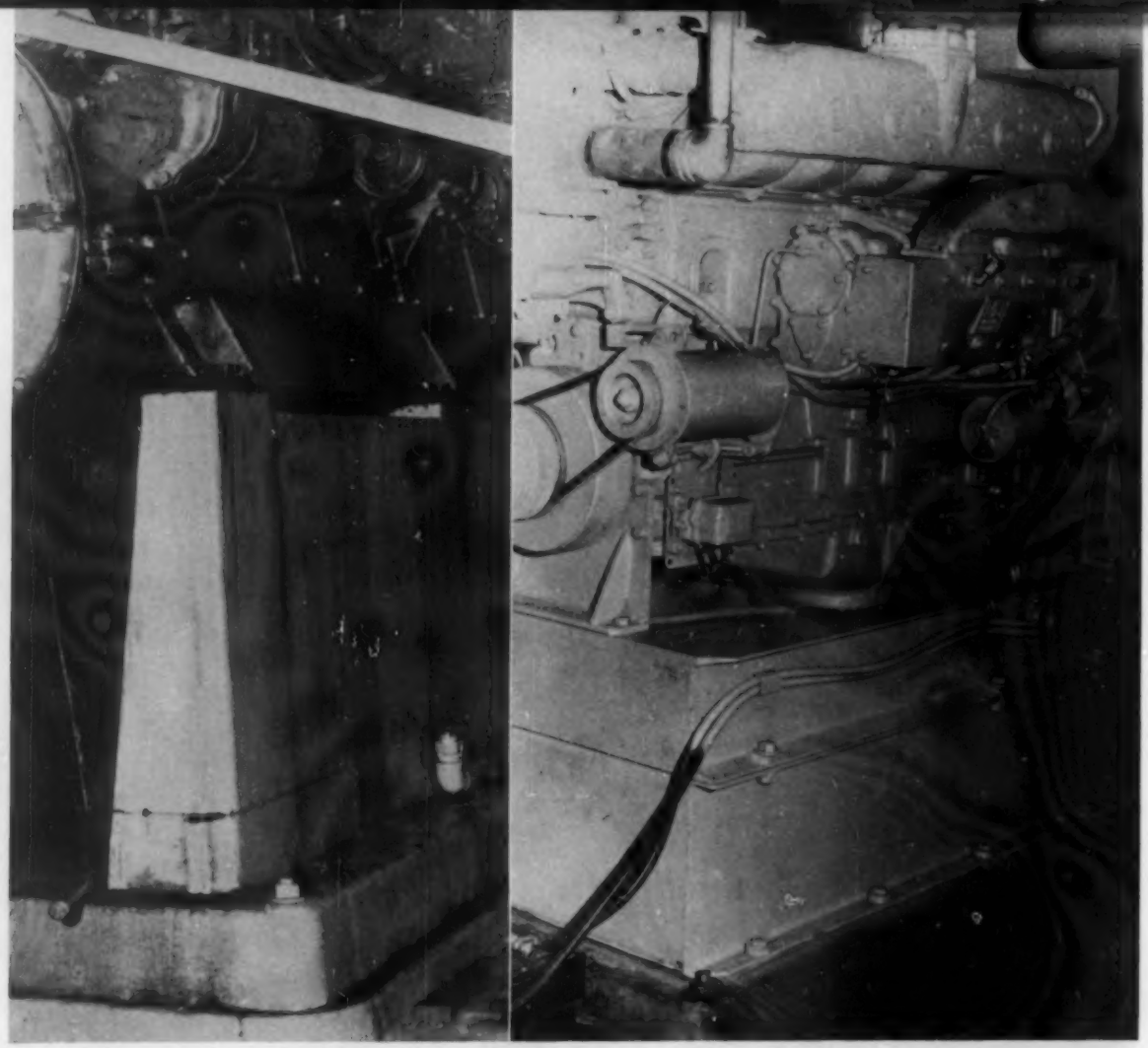


Plain wedges . . . an old trick

ENGINE REPLACED

Four men two days from start to finish . . .

By DAN McCONNELL, Engineer

THE JOB — To replace a Sterling 8 cylinder gasoline engine driving an emergency clear water pump with a GM 300 hp 2-cycle diesel. The old engine, which had run hard since 1937, was on a high cast iron bedplate to accommodate a 2-stage Ingersoll Rand 6GT pump.

¼" holes were bored in the base while the unit

was running — 2" on center in the compression side of the bed and 4" on center in the tension side.

With the engine off, holes were bored 2" on center in the tension side and taper-reamed to fit No. 5 Morse taper pins. The pins were lightly coated with white lead to prevent galling.

LOWER PHOTOS — Pins were driven in with a 1 lb hammer to wedge off the 3/8" cast iron. Ribs were then broken out with a sledge. The maintenance men found that 2" on center was not close enough and had to do some hammering to start the crack. The holes on the other side were drilled 1" on center and 15 minutes later the side was down.

The ragged ends were squared up with a chisel and a portable grinder, the new bed set down and capscrewed to the old base and the new unit shimmed to line up.

Gastonia, North Carolina . . .

Roof-Mounted Bake Oven

In the area at the left, parts are cleaned and chemically treated prior to painting. Dip tanks contain cleaning solutions, chemicals and rinse water. Dichromate treatment improves paint adhesion . . . surfaces not to be painted are masked, holes are plugged and parts are racked for painting . . . plant has one hand spray and two electrostatic spray

THE NEW Gastonia, North Carolina 145,000 sq ft plant of The Homelite Division of Textron, Inc. was designed and built for the production of chain saws — items formerly being manufactured along with other products at the Company's Port Chester, New York plant.

The North Carolina plant was constructed when increase demand for these chain saws made it impossible to produce the volume required at the Port Chester facilities.

An interesting phase of chain saw production is the finishing of aluminum and magnesium parts for as many as 500 saws per day. Some 60 different parts (crank cases, fuel containers, drive cases, throttle handles, filler caps, pulley covers, etc.), are painted with vermillion, opalescent green, black, silver and other enamels.

The finishing system engineered by the J. O. Ross Engineering Division of Midland-Ross Corporation, employs two electrostatic spray booths and one hand spray booth. At the older Port Chester, New York plant a hand spray system was used for both saw and other parts. The new electrostatic line, for chain saw parts exclusively, has decreased paint consumption, reduced man-power requirements and increased production rates.

Parts (mostly die castings) come to the paint finishing room from the machine shop in cardboard boxes, and each component is blown clean of loose foreign particles and turnings are picked from machined holes.

The parts are then placed in wire baskets and travel by conveyor to the degreasing and dichromate area. They are moved through the degreaser at the rate of 40 baskets per hour, and upon removal are generally dipped successively in seven tanks containing the chemicals specified in the Dow No. 7 process. These include hot alkali, cold water rinse, hydrofloric acid, cold water rinse, sodium dichromate, cold water rinse and hot water rinse.

. . . 500 chain saws per day

Conserves In-Plant Floor Space

booths . . . in electrostatic booth parts are painted by disk method. Spinner-wheel work-hooks rotate against friction bar within booth to turn parts every two feet of travel, assuring overall coverage . . . finished parts are then conveyed to roof-top baking oven — see next page.

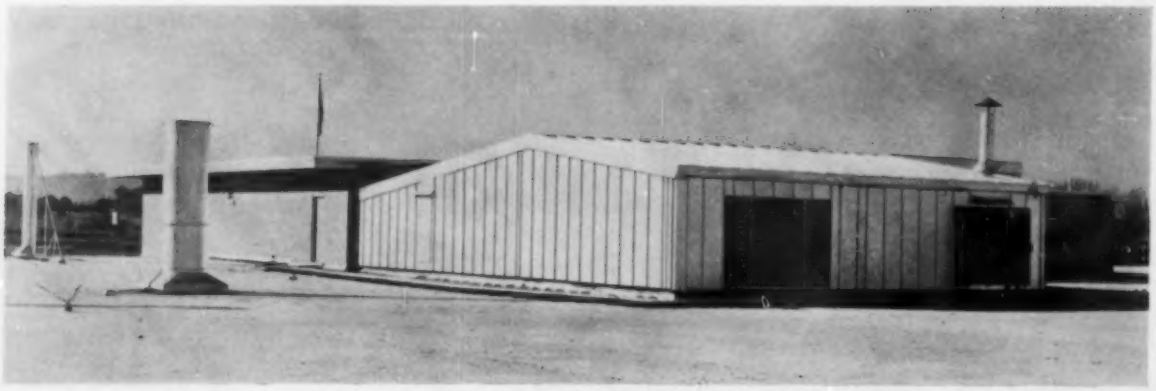
An electrically operated monorail hoist raises and lowers the wire baskets from and into the various tanks. Fumes from the tanks are drawn off through hoods at the rear and are exhausted to the atmosphere. Tank solutions are purified before being discharged into waste outlets.

Following metal cleaning and preparation, the baskets are placed on a roller conveyor which carries them to the masking and racking tables where girls mask those areas not to be painted, plug holes which should not be coated, and hang the respective parts on their proper rack.

Rack-loads of similar parts are accumulated on overhead trolley-mounted hangers and when a lot has been accumulated, the racks are transferred to the live monorail conveyor which carries them through the electrostatic and hand spray booths, flash-off tunnel, bake oven, and to the de-racking area. The conveyor travels at 15 fpm (variable from 6 to 18 fpm and hooks are on 18-in. centers.

Racks are designed so that parts will fit into an imaginary cylinder 14-in. in diameter by 36-in. long. This will assure maximum coverage within the electrostatic spray booths. Paint is applied by the disk method, the electrically charged particles being spun from the 15-in. disks and collected by the grounded parts. The hooks upon which the parts hang are of the "spinner-wheel" type and rotate as they make contact with a friction bar within the booth, making two revolutions per foot of travel so that all surfaces are covered.

After leaving the electrostatic booths, parts travel through a hand spray booth where those which require it are touched up. Most parts require little or no hand attention, although certain shapes do require this final step. Upon leaving the hand spray booth, the parts travel for about three minutes within a flash-off tunnel which leads to the roof-mounted bake oven. They make several passes within the direct fired oven and



IN THE ROOF-TOP BAKE-OVEN parts travel for 23 minutes at 300 F. Louvers admit make-up air. Doorway leads to oven heater box, control panel and make-up air equipment.

Make-up air (photo on opposite page) is brought to room temperature by line burners and passes thru continuously moving filters prior to being delivered to the paint finishing room.

Fuel and air supply and control equipment servicing bank of three line burners which heat make-up air. Depending on outdoor temperatures, one, two or three burners may operate at a given time. They are automatically regulated to cut in and out as required to maintain preset air temperatures.

are baked for 23 min at 300 F.

As parts descend from the oven they enter a de-racking area where racks are transferred to an endless monorail conveyor on which they travel until attendants remove and hang them on stands at the packing tables. Here parts are de-racked and again placed in cardbord containers which go to assembly areas. A limit switch stops the conveyor in case the attendant fails to remove a rack at the end of the line.

Air Make-Up

In addition to the oven and related heating equipment, air make-up units are also located on the roof, thus further conserving in-plant floor space. Air make-up equipment includes a three-stage gas heating system having continuously moving air filters and a 55,000 cfm fan ducting to the finishing room. The burners warm the incoming air in the winter to bring it up to room temperature and are designed to bring outdoor air from 20 to 80 F. Burners operate in stages, depending upon heating requirements. The filter medium continuously unwinds from one spool onto another, thus providing effective dust separation at all times.

The fan, located downstream from the burners and filter, discharges heated, filtered air into a duct for delivery to the paint finishing room. This room is walled off from the rest of the plant to prevent plant dust from depositing on finished parts. The air from the make-up system maintains the room under slight positive pressure as a further precaution against infiltration of dust.

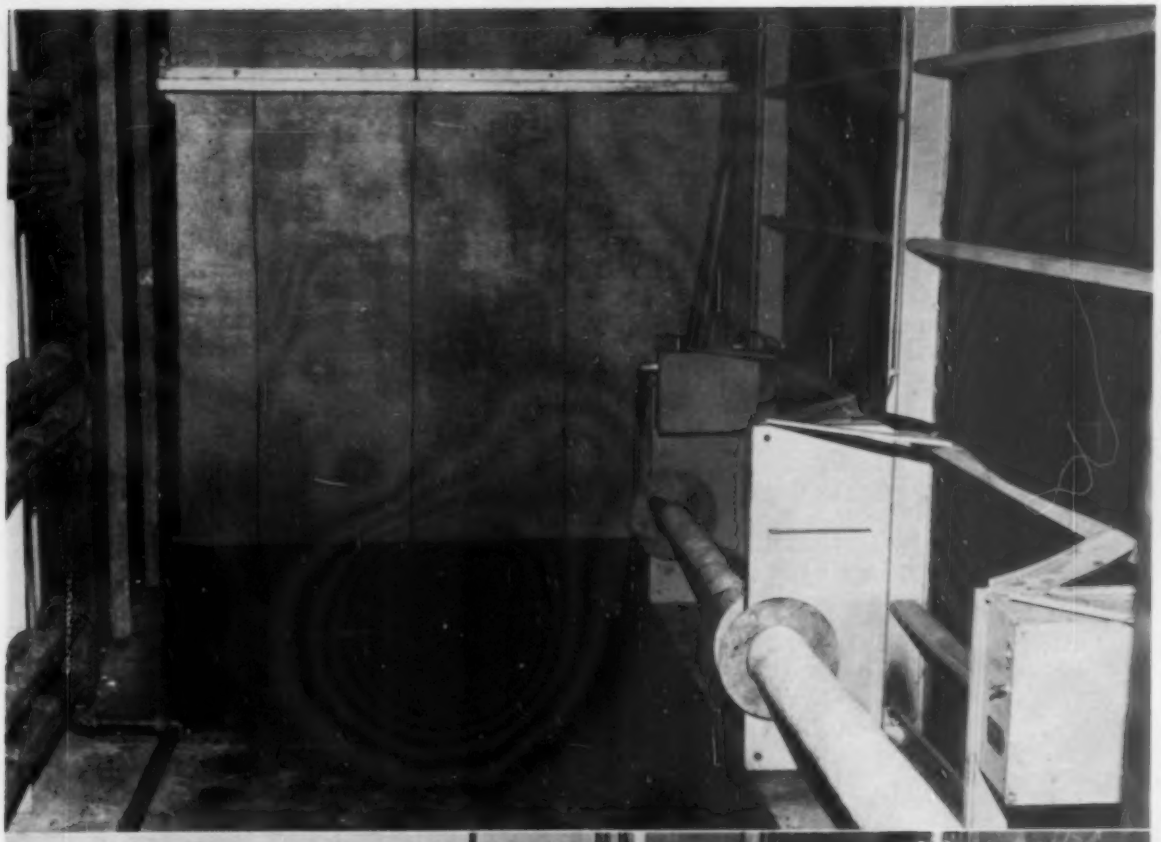
A gas-filled temperature sensing bulb is located at the entrance of the air make-up duct, and connects (via tubing) with a controller instrument which regulates the three stage burners. As gas in the bulb expands or contracts, it regulates a valve at the controller. This valve varies the pressure of instrument supply air, activating various control units to regulate the line burners as air temperatures vary. Controls for the air make-up supply fan and air make-up combustion blower are located within the roof enclosure. The temperature controller is located in the paint finishing room.

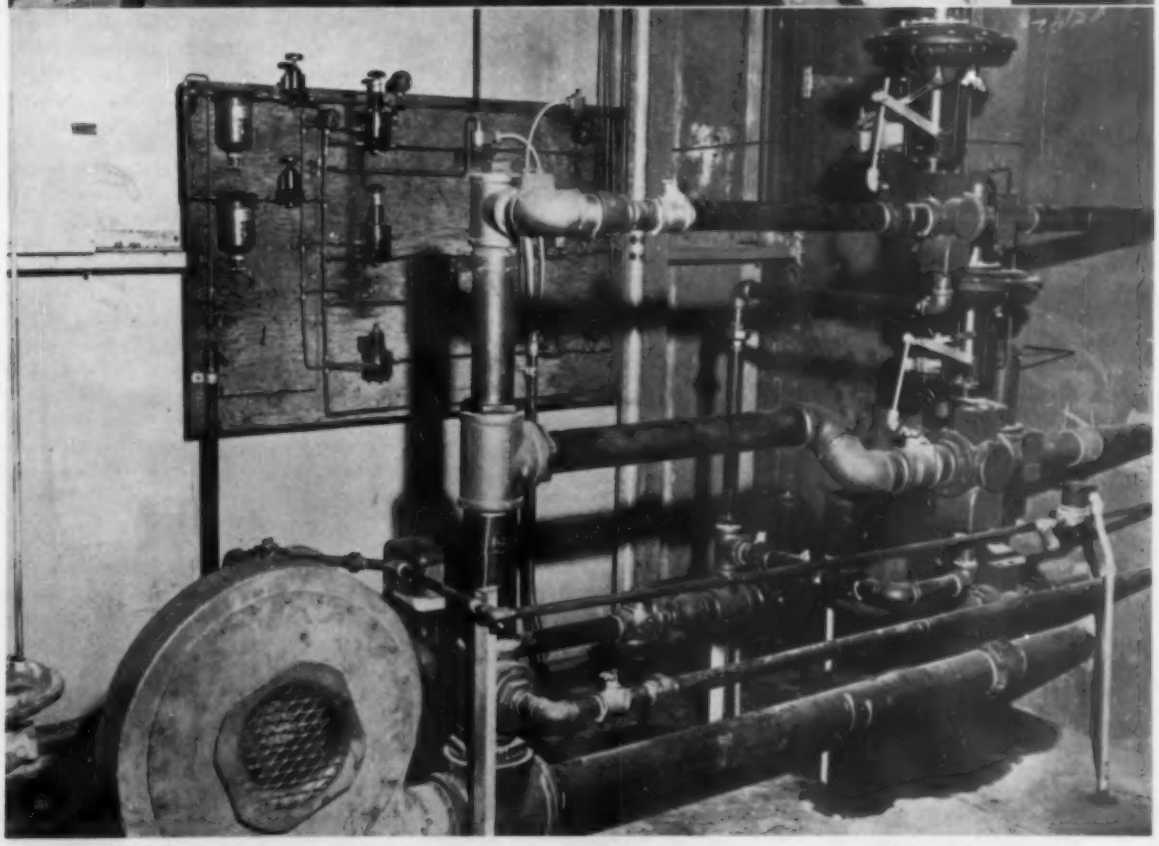
Temperature Control

A gas filled temperature-sensing bulb is located within the oven near the discharge duct and connects to a recorder-controller in the paint finishing room. As oven temperature deviates from the set valve the controller is activated to regulate a valve in the fuel supply line. This in turn increases or decreases the output from the burners which are rated at 3,000,000 Btu/hr. Controls for the oven exhaust fan, oven supply fan, and oven combustion blower are in the roof enclosure.

Oven and make-up air heating systems are equipped with customary safety devices and the overall system includes numerous interlocks to assure that one piece of equipment will not operate until related units are in operation.

Electrostatic Spraying System	Ransburg Electro-Coating Corp.
Paint System Conveyor	Jervis B. Webb Co.
Baking Oven	J. O. Ross Engineering Div.
Burners	Maxon Premix Burner Co.
Filter in Air Make-up System	Farr Co.





"The Clerk in the Dark Blue Suit"

By JOE TABB
Macon, Georgia

JOSEPH L. TABB, JR. has had over 10 years training experience in diverse business and industrial fields — warehousing, merchandising, metalworking, textiles, pulp, paper, and building supplies. His educational training includes Emory University and the U. S. Army and Air Force Schools of Personnel Administration.

THERE is nothing unusual about a clerk reporting to a new job in his good blue suit. Most people like to make a good impression in their new work surroundings.

In the case of "Tony," as we will call him, this desire to look his best led to trouble.

Tony was hired in the front office. He was told that he would work in the Transportation Office of the Warehouse Department. He also understood that his duties would involve checking shipping papers, and that he should know something about vehicle and machine parts. This was O.K. with Tony since he had been a mechanic in the army before taking his business course to prepare him for advancement to better jobs.

Tony was told many details of the company rules and what he could expect from "fringe benefits." One slight oversight led to all of the trouble. Here's what happened:

In spite of the fact that it looked like rain when Tony reported to work, he wore his best blue suit. Remember? — he wanted to make a good impression.

Soon after his arrival at the Transportation Office, he was given a clip-board with a bunch of shipping documents and shown to a warehouse dock where he was instructed to check in and verify quantities of parts being stored in an adjacent warehouse. This was not a bad job — Tony liked activity and found that the material being handled was much like that he had used while in the army. He caught on quickly as he bustled around the area.

Then, it started raining!

The lift drivers and laborers in Tony's work area didn't seem to mind the weather. The light rain couldn't do much damage to the denims, khakis and leather jackets they usually wore.

Tony kept working for awhile hoping that the rain would soon stop. But, it was not that kind of rain — he was soon convinced that he was in for a day of slow drizzle — and a ruined suit.

Tony looked toward the office where he could see his supervisor sitting at his desk. In fact, for some time, Tony kept looking in his boss' direction more than he was looking at the work close to him.

Shortly before noon, Tony walked into the office, laid the clipboard with its documents on the supervisor's desk, and announced that he was quitting!

DISCUSSION —

At first glance, it looks like Tony was a little quick on the trigger. After all, employers hire adults and cannot afford to "wet nurse" them through every situation

Before we start fixing blame, let's look at some obvious facts and problems:

1. Tony was not too far off base to assume that a clerk's job would be located in an office. He certainly cannot be condemned for wanting to make a good impression.

2. Without question, Tony's action in quitting without an effort to get his boss to give him relief cannot be defended. He just "blew his top." However, we should also remember that people do not always act according to logic. We are creatures of *emotion*, and these emotions can be strong motivators — especially, under certain conditions. A young man who probably has only one good suit can be quite emotional when he fears damage to such a prized possession.

3. It is not always the "dead head" who leaves a job soon after employment. You, as the employer, may be inclined to condemn him because you are "sore." Actually, the new employee frequently leaves because he is an outstanding person who has found that he is not happy but also knows where he can get another job without much trouble. The "dead head" may be inclined to stick it out and be a "sore headed" low producer.

4. Regardless of who was right or wrong, all concerned have LOST. Tony lost a job, and the employer lost the money invested in recruiting, employing and inducting. And it *could* be that, under happier circumstances, the employer and Tony could have profited by a long term association.

"HINDSIGHT" —

After Tony "pulled the plug," there was little to be done. "Hindsight" *can* be helpful in improving our ability to effectively handle future situations. Here are some suggestions, if they had been used in Tony's situation, that could have been effective:

1. The immediate supervisor for whom an employee will work should make the final selection from qualified applicants. Front office or personnel technicians may screen, test, investigate and otherwise see that applicants meet job requirements before they are referred to the supervisor for selection. The worker's immediate supervisor is in the best position to explain the details of working conditions and requirements.

2. Induction of new employees should follow a predetermined plan.–In the every-day routine of work, new workers and their special needs are easily overlooked. A plan, with a check sheet for supervisors to follow, may get old to the regular people, but remember, it is fresh and new to the worker during his first days on a job.

3. In this case, the supervisor could have kept in touch with Tony and assigned him to other duties when the rain started. It is agreed that an employee must perform the duties for which he is hired, but some concession to help in a happy adjustment to the job is always a good investment. Frequently, the new employee's attitude is "made" or "busted" during the first few hours of employment.

Getting a new worker off to a good start is a multi-sided responsibility. Top management, staff people, superintendents, foremen, lead men, fellow workers, and the *new worker* have a part to perform.

The new worker may be hesitant to ask questions, but he must be encouraged to do this rather than to go off on a tangent. After all, they should assume that they are wanted and needed or they would not have been hired.

From another side, new workers are not mind readers. They have many details to remember. To assume that they understand is dangerous.

To assume that we, as supervisors, will remember everything that we should do is equally dangerous. A well developed induction plan, including the roles of "front office," middle management, and immediate supervisor, is a good way to help make thirty year men out of many of the "Tonys" who otherwise might get away.

Miami, Florida . . .

PVC Pipe and Bends

ELECTRICAL code of the city of Miami Beach now specifies that rigid unplasticized polyvinyl chloride pipe, Schedule 40, should be used for conduits in certain installations of electrical, signal and telephone wiring where corrosion is a problem.

The Florida Power and Light Company used 2-in. Schedule A, High-Impact National PVC Pipe and Schedule 40 PVC conduit bends to install electrical wiring to oil circuit breakers at the Greynolds Substation, North Miami Beach.

The above photo shows how a bend is readily joined to a length of pipe by simple solvent cementing. This is the fastest and easiest method and results in the highest joint strength. Threading, which is only recommended for Schedule 80 or heavier walls, and heat welding, are other methods of joining PVC pipe. The smooth interior surface provides trouble-free wire drawing.

National PVC pipe, extruded by the National Tube Division of U. S. Steel, can be easily cut with a hack saw, tubing cutter or rotary power saw. Since it is desirable to obtain a square cut, especially when threaded joints are required, a mitre box should be used when cut with a hand hack saw.

National Tube extrudes "normal impact type" for installations requiring the highest chemical resistance attainable together with high strength and excellent creep properties; and "high-impact pipe" for installations requiring excellent chemical resistance and a high degree of toughness, even at low temperatures. Standard lengths are 10 and 20 ft. Nominal size ranges from ⅛-in. to 12-in.

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COAL HANDLING

Level Controls

Stoppage Alarms

. . . automatic policing is vital

◆ There is no question but what the present trend toward cleaner and more automatic coal handling facilities will continue. This means an increasing demand for coal level controls and coal flow alarms.

◆ Manufacturers of this equipment should take heed of the great responsibility assumed by their devices, and therefore they should design and manufacture them to give absolutely reliable operation.

◆ Plant designers should select carefully the type of unit which best suits their requirements and make sure through proper installation that the units purchased will do the work required of them.

◆ Operating men should maintain coal level switches and coal stoppage alarms regularly, because failure of this equipment can cause them operating difficulties of much greater magnitude than the small amount of work required for routine maintenance.

AS COAL HANDLING facilities and bunker to pulverizer equipment become increasingly automatic and dust-tight, it is imperative to install reliable coal level controls and coal stoppage alarms. These serve both to control the flow of coal and to give suitable alarm in case any stoppage or failure occurs.

Here is a description of the construction of various types of coal level switches and coal flow switches. For dependable service, these devices must not only be mechanically reliable, but their application and specific mounting locations must be proper.

Adapted from comments by **ARTHUR J. STOCK**, president of **STOCK EQUIPMENT COMPANY** at the 21st Annual **ASME-AIME** Joint Solids Fuels Conference at Old Point Comfort, Virginia.

SOME years ago the coal handling operation between the coal storage pile and the stoker or pulverizer was watched by a number of men at various transfer points, so that reliable coal feed all the way to the furnace was assured. Some work stations of the coal handling crew presented unsatisfactory working conditions, due mostly to coal dust.

The development of the modern plant has demanded dust-tight operation and also operation with a minimum number of men. Mechanical or electrical equipment which will monitor coal presence or coal flow at various points, for either conveyor control or for alarm purposes, has become a necessity. The need for such equipment is even more apparent when the tremendous coal demand of modern units is compared with the demand of older units.

Coal level or coal flow switches can prevent many hazardous conditions caused by the interruption of coal flow. When it is considered that conveyors carry many hundreds of tons of coal per hour at high speeds, it is obvious that automatic policing of such equipment is vital. It is almost impossible for an operator to observe faulty operation and stop equipment quickly enough to prevent a considerable pile up of coal.

Under some conditions the stoppage of fuel feed to a boiler can endanger life and property, as well as impair the boiler's load carrying ability. For this reason, many boilers are equipped with an extra pulverizer. In the event coal stoppage occurs on one, it may be possible to transfer that load to another. However, the stand-by unit may not be available due to maintenance. What is worse, conditions that cause stoppage of coal flow frequently exist simultaneously in the feed systems to several pulverizers. If such is the case, it could be possible for bad coal flow conditions to shut down the entire unit. Careful control of the coal flow with automatic safeguards is, therefore, required.

The modern large boiler unit receives coal in considerable tonnages at a very few points located close together. Hence the useful length of the bunker is limited, and it is necessary for bunkers to be of great height if they are to contain a reasonable coal supply. As a result, bunkers become very expensive.

Plant designers have been looking for ways and means of reducing bunker costs. The trend seems to be toward smaller inside storage and continuously operated coal handling facilities. If coal handling must become automatic in order to reduce the initial cost of the plant, then various forms of mechanical and electrical coal level and coal flow control equipment become necessary to assure continuity of operation. This equipment must be absolutely reliable.

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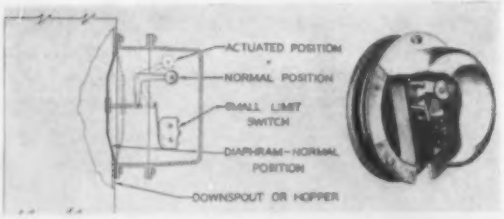
THE MAJORITY of coal level switches and stoppage alarms indicate the presence of absence of coal at a point, whereas only two types directly show coal flow.

Those indicating the *presence of coal* (spot alarms) include diaphragm, paddle, ball, rotating, electronic-capacity sensitive, and pneumatic types. Those indicating *coal flow* include turn counting and sound or vibration.

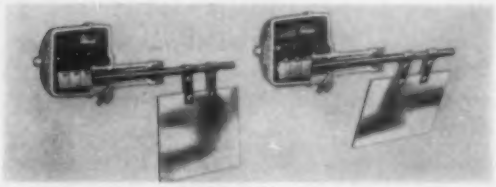


Diaphragm Type (Fig. 1) of Coal Level Switch, the earliest type that was developed to the point of becoming a commercial success, consists of a diaphragm which is mounted on the side of a downspout or hopper in such a fashion as to be deflected by the pressure of coal within. The deflection of the diaphragm, which is opposed by a counterweight, actuates a small limit switch or mercury switch connected into the alarm or control circuit.

A diaphragm unit used in a hopper for level control must be so mounted that the coal will normally only partially cover the diaphragm when a signal is expected. However, a high level indicating unit should be mounted sufficiently low that the coal could cover the entire diaphragm in the event the switch had not actuated earlier. This provides for slight variations in the required actuating force. Likewise, a low level indicating unit should be mounted sufficiently high that the diaphragm could become completely uncovered to assure operation.

It is essential that free flow of coal to and from the diaphragm units be provided at all times. This

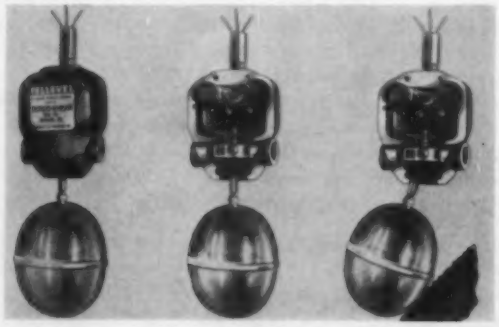
is best accomplished by mounting the units on a vertical side of a coal hopper.



Paddle Type (Fig. 2) consists of a paddle which is deflected by the presence of coal. Homemade designs of the paddle type were used at a very early date. However, these early attempts were relatively unsuccessful because of the difficulty of assuring reliable operation of the bearings in the dirty and corrosive coal atmosphere. Modern commercial types are reliable because of proper seals for the bearings.

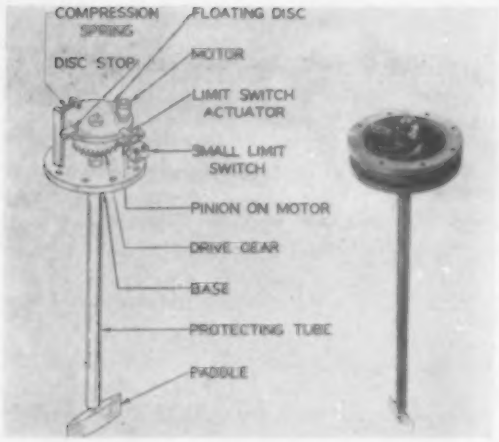
The deflection of the paddle by the coal causes rotation of a horizontal shaft. This shaft in turn rotates cams that actuate small limit switches. The cams are readily adjustable, so that the switches will operate at the desired point or points.

Paddle type coal level switches should be located where the coal flow is active. The flow should be normal to the face of the paddle. Frequently baffles must be provided to prevent coal from getting around to the back of the paddle and blocking its operation.



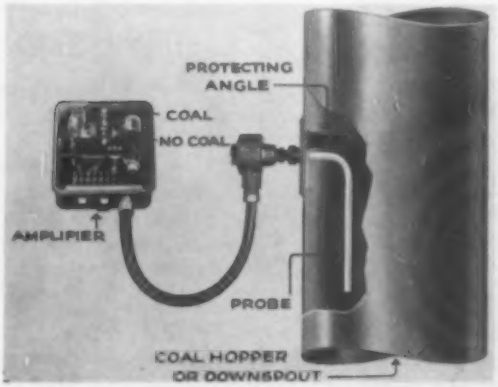
Ball Type (Fig. 3) is a small and compact device which is actuated by the coal surface. It may be mounted at the end of the conduit that carries the electrical leads. It is, therefore, very simple to install.

The ball is supported by a vertical shaft which in turn is carried by a gimble ring, such as used on compasses or gyroscopes. The gimble ring allows the ball to move in any direction in a horizontal plane, and therefore the direction of approach of the coal to the ball type coal level switch is immaterial. When the ball is deflected from the vertical position, the upper end of the shaft is cocked, thus actuating a small limit switch. A flexible rubber diaphragm prevents coal dust from getting into the interior of the device.



Rotating Type (Fig. 4) is a motor driven device that indicates coal presence when a rotating vane is stopped by coal. In the line drawing, a motor is shown driving the vane through a pinion and gear. The motor is mounted on a floating disc, which is not directly connected to the vane shaft. The normal position of this disc is determined by the compression spring and a stop. When the rotation of the vane is stopped by coal surrounding it, the rotation of the gear is also stopped. As the motor is still energized, the floating disc on which the motor and pinion are mounted rotates around the drive gear, thus compressing the compression spring and actuating a small limit switch controlling the alarm circuit. When the motion of the paddle is no longer restricted, the compression spring returns the floating disc to its normal position and the limit switch opens.

Best operation from the rotating type of coal level switch is obtained when the shaft is mounted vertically, as eccentric loads are avoided. The shaft may be quite long, and in that event it should be protected by a fixed tube that also carries an outboard bearing. The rotating type of switch has an advantage in that its action depends only upon coal being present and not upon the surface of the coal developing any pressure.



Electronic - Capacity Type (Fig. 5) depends pri-

marily upon the presence of coal between a probe and ground, which is the surrounding chute or hopper. The dielectric constant for dry coal is appreciably higher than air, and the dielectric constant for wet coal is even higher. The capacity type of coal level switch is actuated by the change in capacity which results from a change in dielectric constant near the probe.

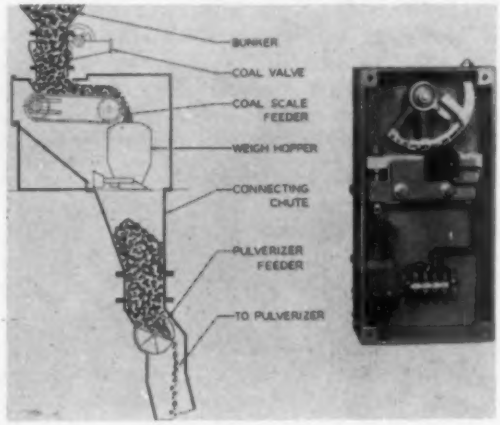
The particular capacity sensitive coal alarm shown in Fig. 5 uses a probe which may be inserted into a downspout or hopper. This probe is protected from the damaging abrasion of coal by a small angle which projects into the coal flow immediately above the probe. The control box should be located within ten feet of the probe, or if conditions permit, the electronic part of the circuit may be mounted in the head of the probe with the output relay and power source at any distance. The output relay may be used to operate an alarm or to control a power relay. The principle of operation is that the capacity between the probe and ground provides the feedback necessary to sustain oscillations in the circuit. It is the presence or absence of oscillations which is detected by the output relay. The sensitivity is adjustable; it is desirable to set it as low as possible so that reliable indication will be obtained in spite of upsetting influences such as accumulation of dust or large temperature changes.

Electronic - Capacity Type (Fig. 6) is similar but has a probe that is considerably larger and heavier. The probe is normally mounted at the end of a 2½" vertical pipe which surrounds and protects the cable to the probe. For this particular instrument, the electronic circuitry is contained in a housing that may be located up to 300 ft away. A bridge type circuit is utilized whose balance is upset by a change of capacity, that is, by the presence or lack of presence of coal.

Electronic - capacity sensitive alarms of either type are available in two forms so as to have a "fail safe" condition regardless of the application. In other words, if failure of the device occurs for practically any reason, it is possible that the resulting circuit be either opened or closed, whichever gives the safe operating condition.

With any electronic device it is necessary to avoid vibration and high ambient temperatures. It is also very desirable to use seasoned tubes so as to reduce the probability of tube failure during operation. Regular maintenance schedule of tube replacement is a must.

Pneumatic Type coal level switches are employed for control within pulverizers, but because of their specialized application, will not be further discussed.



Turn Counting Type (Fig. 7) of coal flow alarm contrasts to all of the above types of coal level switches in that it monitors flow and not just presence of coal. It polices specifically the entire coal flow circuit from the inside of a coal bunker to the inside of a pulverizer. It is necessary that an automatic coal scale be in that circuit, for the alarm depends upon the coal scale operating in proper relationship to the pulverizer feeder.

The usual bunker to pulverizer arrangement consists of a coal valve at the bunker outlet, an automatic coal scale, and a pulverizer feeder. The pulverizer feeder must be of a type which discharges a predetermined volume of coal per turn of the feeder shaft. The coal scale weighs out a definite batch of coal during each weighing cycle. Now if the scale has a capacity of 200 pounds and if the feeder discharges 100 pounds for 11 turns, then the following relationships hold:

22 Turns of Feeder Shaft = 200 lbs of Coal ± 10%.
One Dump of Scale = 200 lbs of Coal ± ¼%.
Hence: 22 (±10%) Turns of Feeder Shaft =
One Dump of Coal.

These relationships hold so long as coal is flowing. If coal stoppage occurs anywhere, then the feeder makes an abnormally large number of turns for one dump of the coal scale. In this example, 25 or more turns would surely indicate coal stoppage. The stoppage could be at the bunker outlet, at the inlet

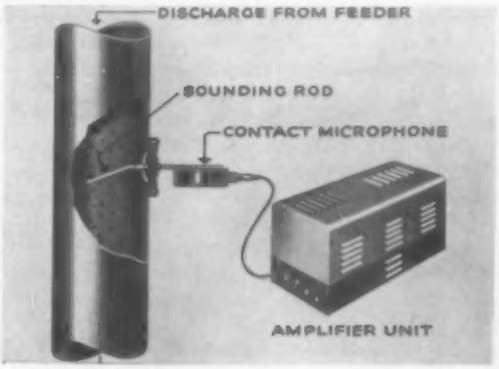
to the coal scale, in the scale outlet hopper, at the inlet to the pulverizer feeder, or in the connecting downspout between the pulverizer feeder and the pulverizer. In the latter case, the feeder shaft rotates without discharging coal. With some types of pulverizer feeders, the turn counting type will also indicate failure of a shear pin, skidding of the feeder plate under the coal, or partial filling of the feed pockets.

The time from the occurrence of a coal stoppage until the alarm is sounded varies according to the time of stoppage with respect to the coal scale weighing cycle. The maximum period (with 200 lb scale) is the time to burn a little more than 200 lb of coal. The minimum period is the time to burn a little more than 20 lb. Failure of coal flow at the bunker outlet or in the downspout between the feeder and the pulverizer may require a longer period of time under some conditions.

The construction of the turn counting type of coal alarm is shown in Figure 7. The unit is usually driven by a shaft extension on the pulverizer feeder. Rotation of the operating shaft of the alarm (not visible in photograph) causes movement of two pawls that in turn rotate the sector gear at the top, tooth by tooth, in the positive direction.

Resetting is accomplished by removing both pawls from engagement with the sector gear by means of a solenoid. This solenoid is connected in parallel electrically with the feed motor of the coal scale. A dash pot between the solenoid and the pawl limits the period of disengagement to a fraction of a second at each start of the scale motor, during which time the sector gear can return to its starting position. In the event that the feeder shaft makes more turns than is normal for one dump of the scale with a reasonable tolerance, then the sector gear is not reset soon enough to prevent its being rotated sufficiently to engage a small limit switch and close the alarm circuit.

The unique advantage of this type of alarm is that it does not come in contact with the coal at any point; it is merely mechanically attached to the pulverizer feeder or equivalent. Therefore, very reliable operation may be expected. Also this is the only type of coal flow alarm that polices the entire coal flow from the inside of the bunker to the inside of the pulverizer.



Electronic - Sound or Vibration Sensitive Type (Fig. 8) is the only device which actually detects the flow of coal when it is in a free falling state rather than in a solid column. A sounding rod projects into the downspout between the feeder and the pulverizer in such a way that the falling coal can strike it. The sound vibrations set up in the rod are detected by an external microphone. This creates electrical ways which are amplified and rectified to give a signal which can actuate a sensitive relay. A time delay is incorporated with the apparatus, so that the absence of sound for very brief periods need not represent a "No-Coal" condition. It is necessary to adjust the sensitivity as with other electronic instruments. In this case, sensitivity relates to the loudness of the noise, which in turn depends upon the size of the falling particles.

APPLICATION OF CONTROLS & ALARMS

PROPER installation of coal level controls and coal stoppage alarms is absolutely necessary for satisfactory results. Many installations have not been as reliable as they should have been because of improper installation.

With all types of level switches and alarms that indicate presence of coal, it is essential that they be placed where the flow of coal is active. If the coal does not feed properly to the alarm and away from the alarm, then coal presence may be indicated when there is coal in the bunker, but none flowing out.

Coal does not flow out of bunkers and hoppers uniformly over a horizontal cross-section, but rather it rat-holes vertically upward from the outlet. This means that the portion of the bunker or hopper immediately above the outlet contains the active coal. The location of equipment on the side walls of a bunker can cause failure in operation because the coal may rat-hole within the bunker itself or may assume a steeper angle of repose than normal, thus preventing operation of the level control.

If the bunker or hopper is equipped with one straight side, it is easier to meet the requirement of placing the coal level controls directly above the outlets. If the coal feed inlet to the hopper is not immediately above the discharge point, then the top coal level switch should be both as close to the loading point as possible

and also between the loading point and the discharge point.

In vertical downspouts with a small cross-section, flow is substantially uniform over the cross-section. Coal level switches can be located at any point around the periphery. However, if these vertical downspouts have a large cross-section, then the coal flow may be much faster on one side than on the other side. It may even rathole. The fast side will be directly above the point where most of the coal is withdrawn. An analysis of the feeder taking coal away from such a downspout will indicate where the most active coal flow exists, and the coal stoppage alarm should be located above that point.

When a downspout is inclined to the horizontal, the top surface of the downspout is usually the preferred location for coal stoppage alarms. The active coal flow is on the top side and any void will start developing there.

In transfer hoppers between coal conveying units, where a free fall of coal exists, coal level alarms should be located outside of the main stream of coal but close enough to it, so if the coal begins to back up into the transfer hopper, the switch will have an opportunity for immediate action. Care must be taken under these conditions, to shield the coal level switch from stray particles of coal that may actuate the switch and give a false indication.

Alarm Systems

One vitally important requirement for coal alarms is that the alarm be sounded sufficiently early to allow the operators time to act, to control vibrators or other equipment for correcting the fault, or to shut down equipment that may be damaged by continued faulty operation. As a rule, alarms which are so located to give considerable warning tend to monitor a smaller portion of the overall system. Hence, several alarms at various points become desirable. For example, in the coal alarm system between a bunker and a pulverizer, three alarms may be advantageously employed:

(1) A paddle type coal alarm at the coal valve or over the feed belt of the coal scale to indicate bunker stoppage.

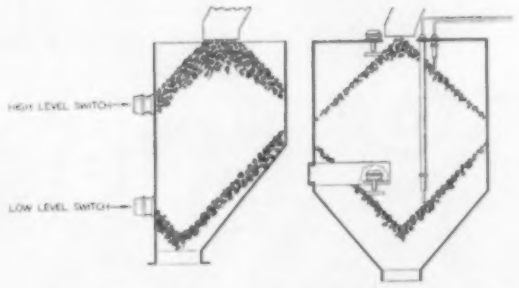
(2) A turn counting coal alarm to indicate stoppage anywhere between the inside of the bunker and the inside of the mill, and

(3) a sound alarm between the feeder and the mill.

The first of these alarms can automatically control vibrators at the bunker outlet and notify operators that a trouble condition exists. This alarm will sound several minutes before the unit is in serious difficulty.

The turn counting type of coal alarm advises operators that there is stoppage somewhere in the system which may, or may not, be serious right at the moment. If the paddle coal alarm at the bunker outlet or over the feed belt of the coal scale, has sounded, then the turn counting alarm is a duplication. But if the paddle alarm has not sounded, then coal stoppage should be looked for from the coal scale down to the mill. When the sound or vibration type of alarm indicates trouble, then the only coal available to the boiler from that pulverizer is the coal contained within the pulverizer itself. Therefore, a serious condition exists and the operator should act quickly.

TYPICAL INSTALLATIONS



Bin with rotating and electronic switches; and, at right, with paddle type switches in downspouts.

Figure 9 shows a bunker equipped with a high level and a low level diaphragm type of coal level switch. Note that these switches are installed on the vertical side adjacent to the outlet. The position of the high level switch is such that the switch may be covered completely, if necessary in order to give the maximum operating force. Likewise, the low level switch may be completely above the coal surface at the low point. The normal operating position for both switches would be in the partially covered position.

Figure 10 shows a cylindrical bunker or silo equipped with electronic - capacity type and also with rotating type high and low level switches The rotating type for the low level must be installed in a dog house projecting into the bunker quite a distance, because it is absolutely necessary that the switch be in the place of active coal flow immediately above the outlet. This location is very difficult to service, but the switch will perform more satisfactorily than if it were located close to the outside shelf.

The probes of an electronic level control should also be located close to the centerline of a cylindrical type of bunker. If the probes were located near the outside shell of the silo, fine wet sticky coal could hang up over the bottom probe in the lower corner.

The top probe may never be reached by a rising coal level if the angle of repose is steeper than normal. Furthermore, it is desirable to keep the probes away from the sides of a metallic silo.

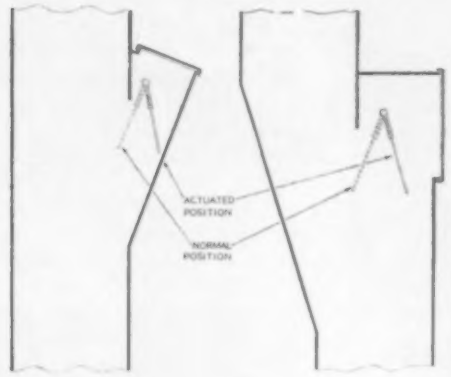


Figure 11 shows two arrangements of paddle type switches. In both, the normal position of the paddle is shown at an angle which requires back weights, so that the center of gravity of the system is directly under the centerline of the shaft. The arrangement at the left is for the typical downspout with vertical centerline. Here the paddle is located in a side compartment with a very steep bottom surface, which will allow the coal to flow away from the paddle in the event of coal stoppage above. The arrangement at the right with an offset to the downspout is the preferred one. As the coal flows away from the outlet of the downspout it will first clear away from underneath the paddle, thereby assuring more reliable operation.

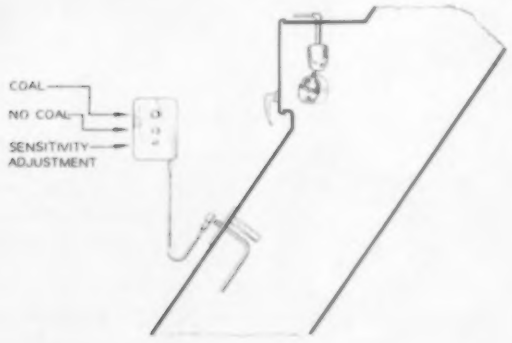


Figure 12 shows the installation of a ball type coal stoppage alarm of an electronic - capacity type alarm in a sloping downspout. In the case of the ball type, a small dog house is provided on the upper sloping surface of the downspout into which the alarm unit is installed. Coal, as it flows down the chute, will effectively move the ball from its normal position to its actuated position. Also, if a stoppage occurs above the ball type of coal stoppage switch, then coal can flow away from the ball very effectively. Substantially the same comments apply to the operation of the electronic - capacity type switch illustrated in the lower part of the downspout. The switch is located in the path of the most active coal flow. Note the baffle ahead of the probe for protection purposes.

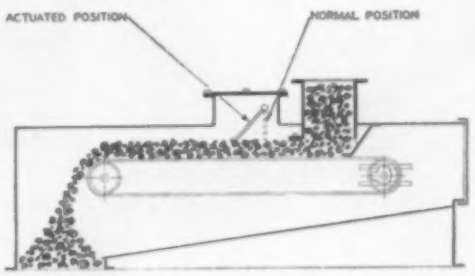


Figure 13 shows a belt feeder equipped with a paddle type coal stoppage alarm. This could be the feeder of a batch type coal scale, or the feeder of a pulverizer or cyclone burner. The paddle type coal stoppage alarm switch here is probably the most reliable application of any type of switch used anywhere. The coal is carried along by force developed by the feeder motor, and hence the paddle can have considerable weight. The large forces available assure unusually reliable operation.

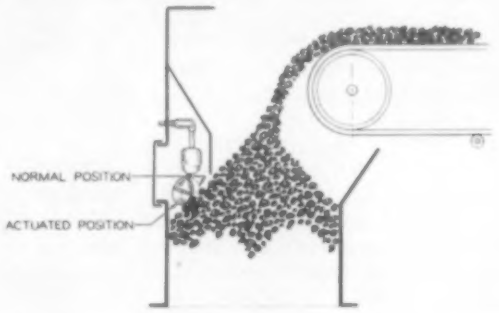


Figure 14 shows a ball type switch at a conveyor transfer point. Note that a baffle is provided to prevent stray pieces of coal from knocking the ball and creating an erroneous indication. Switches located at such transfer points are usually employed to stop the coal conveying equipment ahead of the switch in the event the equipment below the switch fails to remove the coal from the transfer hopper. Such switches are extremely important because of the tremendous quantity handled by modern belt conveyors.

The chute below the switch should continue vertically downward or to the left. It should not continue to the right, because then there is a possibility of coal build-up underneath the switch to cause erroneous operation. In the event it is necessary to move the coal to the right, the switch should be located on the right hand side. If the transfer hopper has discharges to the right and to the left, it is usually desirable to employ two switches, one on each side.

CHECK LIST — OPERATING DIFFICULTIES

Various troubles are enumerated below so that the plant designer will be aware of the diversity of problems that can occur. He should then be able to select the best equipment for his particular needs and to install it so that it functions properly. No recommendation of one type of alarm over another is intended.

1) Corrosion and abrasion are enemies of long lasting equipment. Parts should be made of stainless steel, heavy rubber, or other materials that will stand up with coal flowing continuously past them. Many units are mechanically attached to the bunker, hopper, or downspout by means of screws that pass through the walls. Corrosion of screws exposed to the flow of coal will prevent their holding the equipment in place for long periods of time. It is recommended that all equipment requiring fastenings use studs welded to the outside of the hopper or other purely external fastening.

2) Fine wet coal, especially if full of clay, has a tendency to build up on the lower edge of any part hanging down into a coal stream. A coal level control or coal alarm should be so designed that this clay deposit will build up at a minimum rate and affect the reliable operation of the equipment as little as possible.

3) Improper location of the coal level switch or the coal alarm is probably the biggest single cause of equipment failure. A point of active coal flow is essential.

4) Certain alarms will be mechanically damaged if they are hit by large pieces of coal. They should be suitably protected or so located that damage from this source is not possible.

5) A coal level switch or a coal alarm should preferably not project into solid coal flow, because it in itself may provide a projection or shelf which may be the cause of coal stoppage. Policing of a coal flow system with equipment that itself may cause stoppages is ridiculous.

6) Coal level switches and coal alarms should be so located that they will not be actuated by stray pieces of coal.

7) Those types of coal level switches and coal alarms that indicate coal presence at one point may not indicate a serious coal stoppage at some other point. Therefore, the overall functioning of the system must be considered. Improper location of coal level switches will not give the desired information.

8) The mechanical and electrical equipment of coal level switches and coal alarms must be protected from coal dust and high humidity.

9) If the coal handling system is totally enclosed, then the air pressure within the system may be different than the air pressure outside, which may force coal dust or moisture into operating parts and cause failure.

10) Vibration may create trouble with certain types of units, particularly where mercury switches or electronic tubes are employed. The use of seasoned vacuum tubes is recommended. Also, all tubes should be renewed at periodic intervals.

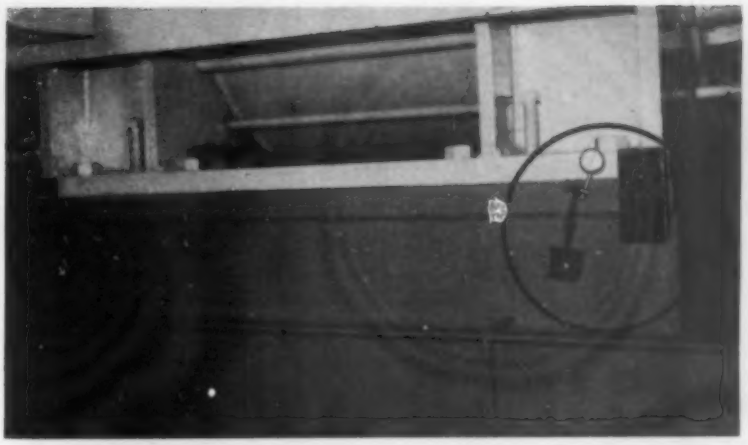
11) It is essential that coal stoppage alarms be so located as to give operators the maximum amount of time in which to do something about the coal stoppage situation. Of course, plenty of time is not always possible. Serious consideration, however, should be given to the use of multiple alarms to assure the operator the greatest amount of time.

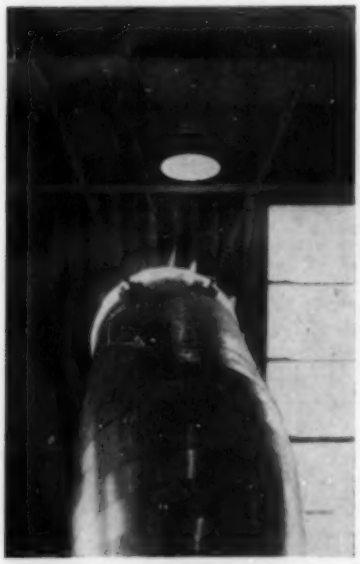
When this discussion was presented at the 21st Annual ASME-AIME Joint Solid Fuels Conference in Virginia, Mr. Stock expressed appreciation for material and photos to: The Bin-Dicator Company, Stephens-Adamson Mfg. Company, Fuller Company, Robertshaw-Fulton Controls Company, Robins Conveyors Division, and Combustion Engineering, Inc.

SOUTHERN POWER & INDUSTRY
a W.R.C. Smith Publication
806 Peachtree St., N. E., Atlanta 8, Georgia

Piping Support

SUSPENDING the exhaust pipe from a member of the steel framework of the plant building at a point between the engine and the exhaust muffler is necessary to prevent excessive loading of the turbocharger or exhaust manifold of the engine at one end and the muffler at the other. It also permits free expansion of the piping without overstressing either end of the unit.





One Texas company solves this support problem by welding two pairs of brackets or ears to the pipe, at or near its point of balance, and then using short chain sections, their upper ends terminating in ⅞-in. bolts. These bolts, in turn, are passed through guide sections welded into the I-beam frame member, with an inclined boss at the top to allow direct pull over the surface of the bolt head.

By adjusting either or both bolts, the pipe can be correctly aligned, and noise-producing contact with the building wall avoided. Use of the chain, rather than long bolts reaching to the pipe attachment units, prevents transmission of exhaust impulses to the building, and results in quiet operation.

By ELTON STERRETT, Houston, Texas.

Alignment Lugs Help

WE HAVE found that maintenance can be speeded up by providing alignment lugs on certain heavy equipment such as motors, fluid drives, pumps, etc.

In some cases we have welded on permanent lugs, and in other cases removable lugs are bolted to the bases. Then, of course, the lugs are equipped with jack-screws to facilitate horizontal alignment.

The devices are placed at each corner and are a great help in original lining-up as well as for maintenance. Held in angular and side alignment in this manner with jack-screws on each side, perpendicular alignment is achieved without losing side alignment. This helps hold outages to a minimum.

C. P. SPARKS
Oklahoma City, Okla.

Cleaning Large Motors

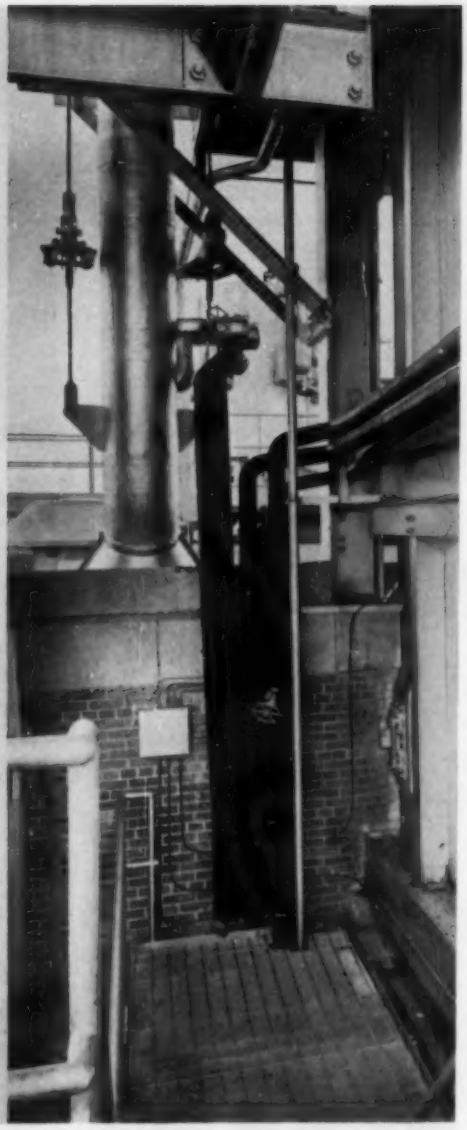
CHECK on the advantages of on-site use of non-flammable, non-explosive and virtually non-toxic "Freon" solvents. At du Pont's Parkersburg, W. Va. plant an enclosed 600 hp motor, used to drive a centrifugal refrigeration compressor was cleaned in one day, without dismantling, at a cost of about $80.

Cleaning the same motor previously cost nearly $400, including dismantling for shipment to an off-plant cleaning and service site.

Method — In cleaning with "Freon"-TF solvent, only the end bells and coil shields were removed from the motor to permit access to the armature coil and stator area. "Freon"-TF solvent then was sprayed on the one-sixteenth-inch coating of oil, grease, and dirt that had accumulated on the coil and stator surfaces. Most of the softened accumulation was then simply brushed off with a small paint brush. The finished cleaning was accomplished by high velocity power-spraying of "Freon" over the coil and stator, and removing the solvent-dirt mixture from the bottom of the motor housing.

Total labor involved in readying the motor for cleaning and reinstalling the coil shields and end bells after cleaning was 16 hours. The cleaning procedure itself required only two hours and the motor was ready for use the following day.

Normally, plant officials explained, it would have required several men a full day to dismantle the motor and ship it to an outside cleaning shop, and the same time to reassemble the motor when it was returned a week later.



Silicones in New Orleans . . .

ANTI-FREEZE SYSTEM for steam and water lines

AN INTERESTING type of anti-freeze system was installed on over 4000 ft of steam and water lines in the 220,000 kw A. B. Paterson Station of New Orleans Public Service, Inc.

Instead of the usual steam tracers or resistance cable, heat is supplied by a single No. 16 copper wire, mineral-insulated and sheathed in copper tubing.

Automatically energized at 40 F ambient temperature, the conductor will maintain the pipe at 40 F even when the ambient temperature drops as low at 10 F.

A major drawback to the use of copper tubing next to steel pipe is the possibility of galvanic corrosion. Conventional insulators either go to pieces when the pipe carries steam or their thermal insulating value is too high.

These drawbacks were overcome by half-lap wrapping the pipe with Dow Corning Silastic R-Tape. The thermal conductivity of this glass-

SERIES 60—normal needs, pressures to 400 psi, 6 sizes. **SERIES 120**—normal needs, pressures to 600 psi, 6 sizes. **SERIES 40**—for extra heavy loads, 5 sizes. **NO. 30**—for extra light loads (½" only). **INTEGRAL STRAINER**—highest pressures and marine use, 6 sizes.

NEW NO. 30 IS A LIGHT LOAD SPECIALIST

When the condensate load in your steam lines is *extra light*—this new Yarway ½" No. 30 Steam Trap is *exactly right*.

Specify it. You'll experience new *economy of operation* with the *tighter shut-off*. Operation is *quieter* due to lever action. *Maintenance is less*—because of the replaceable valve-seat assembly, only one moving part and stainless steel construction. Enjoy these special features plus all the regular advantages of famous Yarway Impulse Traps such as *quick heating, even temperatures, small size, good for all pressures, non-freezing.*

Over 1,250,000 Yarway Impulse Traps already sold; buy yours from one of 270 local Industrial Distributors.

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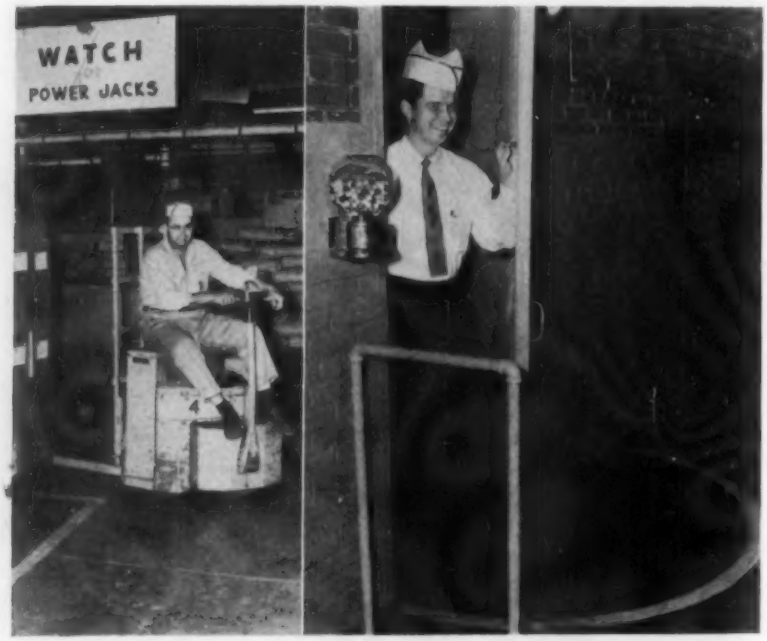
YARWAY *impulse® steam traps*

cloth-backed semi-vulcanized silicone rubber permits rapid diffusion of conducted heat. It is easily vulcanized in place by "blowing down" the wrapped lines with steam. Cured to a solid, one-piece jacket, the R-Tape protects the lines against moisture and rust.

Thermal insulation consisting of fitted foamed glass sections, plus an asphalt compound coating provides further protection.



Charlotte, North Carolina . . .

Flashing Lights & Yellow Lines

IT HAS BEEN estimated that 12% of all industrial accidents can be charged directly to unguarded or improperly protected power machines. The responsibility of looking into these accidents, carefully studying the situation and finding possible preventive measures usually falls on the shop foreman.

Such was the situation in our own Receiving Department. Linard Knight, foreman, was conscious of accidents. He realized the aisles in the Receiving Department were not marked properly, nor guarded from the huge power jacks which are continually moving up and down these aisles. Here was an unsafe condition, even after thorough education of all employees and instruction on preventing accidents.

But Linard Knight was still thinking of the serious danger of the power jacks. He submitted a suggestion that large signs be placed at all walkways where they enter main aisles. His idea was not just a big sign that possibly could be ignored, but a brightly painted sign with a flashing red light at all times, which could not possibly go unseen. This suggestion was carried out (left photo) and four "Watch for Power Jacks" signs were placed in the Receiving Department.

Linard was aware of another dangerous condition here at Lance. The corridors near the big iron fire doors were a dangerous area. A person walking down the corridor could be knocked down when someone unknowingly came out of the fire door with a strong push. Glass doors would solve the problem perfectly but insurance regulations prohibit them.

Linard solved this by having a 2-in. yellow line painted along the line of the sweep of the fire door. This reminds everyone coming down the corridor to the door that there is a chance at any time that the door might open without a moment's notice.

Both of these safety measures have done much to cut down on accidents here at Lance. This is a good example of a foreman providing and maintaining a safe working environment, ever conscious of ways to prevent accidents.

By A. L. BECHTOLD, Personnel Director, Lance, Inc., Charlotte, N. C.

Facts on LIGHTNING

THE HAZARDOUS antics of lightning and means of protecting life and property against lightning are contained in a new free booklet *Lightning Facts and Figures* available from the Lightning Protection Institute, 53 West Jackson Blvd., Chicago 4, Illinois.

Kiln Roll Repair

(*Starts page* 22)

face cut smoothed out the surface. Then the roll was put back in service.

The total cost for materials and time, including applied overhead, was $2,400 for the two rolls. Adding the cost of the welding equipment, which they retained for use on other maintenance repair work, the cost of the job came to $3,600. Compared to a replacement cost of $5,300, there was a net saving of $1,700.

Trapping Standardization

. . . steam trap standardization plus standardized hook-ups spell lower maintenance costs

An important weapon in the fight against rising maintenance costs is standardization. It can reduce the variety of maintenance problems and simplify those which remain.

Since we specialize in steam traps we'd like to offer some suggestions for a trapping standardization program. Such a program involves standardization on one make of trap and standardization of hook-ups.

Trap Standardization

The advantages of standardizing on a single make of trap are important and can make a big difference in the cost and ease of repairs because—

1. You can carry a more complete stock of repair parts with a smaller inventory.

2. Maintenance personnel has the opportunity to become expert on one make rather than be "jacks of all traps."

3. As an exclusive user of one make of traps you become a preferred customer of your trap representative and can be sure of getting the best possible service.

4. You can enjoy the advantages of standardized hook-ups.

Standardized Hook-ups

Standardized hook-ups facilitate and reduce the cost of both original installation and maintenance. By adopting standards for the dimensions of all fittings, including nipples, each hook-up for a given size of trap is identical and can be fabricated in the pipe shop.

Unions should be used so that when a trap needs repair, the unions can be uncoupled, the trap lifted from the line and a spare carrying identical length nipples and half unions slipped into place. In as little as a minute or two a faulty trap can be replaced. The faulty trap can go back to the storeroom for repair when convenient and then be put into stock as a spare.

Figure 1 shows a typical standardized hook-up used by a major chemical manufacturer. Note how

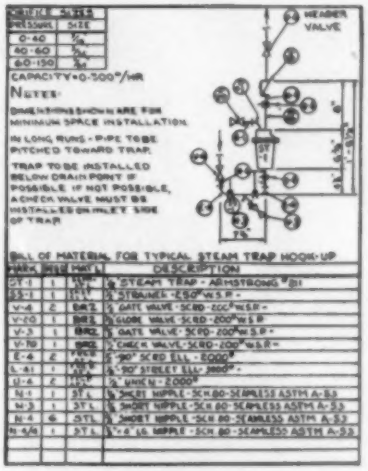


Fig. 1—Typical standardized installation hook-up used by a leading chemical manufacturer.

the hook-up provides the following advantages:

1. Test valve in trap cap permits fast, easy checking of trap operation.

2. Strainer ahead of trap protects it against dirt and scale.

3. Blowdown valve in strainer provides easy cleaning.

4. Check valve in discharge line isolates trap when test valve is opened.

5. Shut-off valves and unions ahead of and following trap permit removal of entire trap from line.

Another important consideration for getting the most from a standardization program is accessibility of the traps. Insofar as is possible, traps should be located so that they are convenient for inspection. The easier it is to locate and get at a trap, the less likelihood that it will be overlooked.

Fig. 2—Armstrong traps have only two moving parts—the lever assembly and the bucket. Nothing much to go wrong here.

What Make of Trap? (This is the Commercial)

Obviously, a trap standardization program shows the best results when the make of trap selected is the one that gives the best service. Naturally, we think the make should be Armstrong and fortunately a lot of trap users agree. Here are some of the advantages of standardizing on Armstrong that have been pointed out by these users:

1. *Armstrong traps work.* They don't leak steam and they do discharge condensate and air as fast as they reach the trap. And they work with any return system.

2. *Armstrong traps aren't "prima donnas."* They need no special care or coddling. Valve and seat are hardened chrome steel. Lever assembly and bucket are stainless steel and these are the only moving parts.

3. *Armstrong traps aren't "orphans."* You can *always* get parts and service from nearby Factory Representatives and stocking distributors.

4. *Armstrong traps are guaranteed.* If you're not *completely* satisfied you can return the traps for refund of purchase price.

More Information

The 44-page Steam Trap Book (free on request) gives a lot more facts on trap selection and installation. Call your local Armstrong Representative or write **Armstrong Machine Works, 8061 Maple St., Three Rivers, Michigan.**

ARMSTRONG STEAM TRAPS

A message of interest to users of Solenoids

This amazing consistency is due to BUSS Engineering.

DETROIT COIL COMPANY

Manufacturers of Dura-Fidelified Solenoids

2685 Fulton Road
Detroit 20, Michigan
Federals

Sept. 29, 1958

Bussmann Mfg. Division
McGraw-Edison Company
St. Louis 7, Mo.

Gentlemen:

In the development of any product, accelerated endurance tests are of the utmost importance. Since our test facilities run unattended for a considerable period of time, it was always an unknown factor when a breakdown occurred; and whether the breakdown was the result of an electrical or a mechanical cause. Since our introduction of Fusetron fuses to this test equipment, we have eliminated this unknown.

For this test work, we need a protective device permitting normal operation of the solenoid, but in the event of mechanical or electrical breakdown, stop the test at a stage where the cause for failure could be examined before the evidence was destroyed.

Approximately two years ago, we started using Fusetron fuses on these tests. We found them to have an amazing consistency in their rating. Since then, where the proper size Fusetron fuses were used, it has been possible for us to determine the direct cause of electrical breakdowns.

We believe that if Fusetron fuses of proper size were generally used in the field, a great deal of coil replacement could be avoided — and resultant costly shutdowns, required while a solenoid is being repaired or replaced, would be eliminated.

This would be a boon to our service department, too, as it would cut down the number of service calls we have to make where the problem is not directly due to failure of the solenoid.

We feel that general use of the Fusetron fuse protection for solenoids would help both our customers and ourselves.

The size Fusetron fuse we use on normal applications is generally about 125% of the holding current rating of the solenoid.

Yours very truly,

DETROIT COIL COMPANY

E. A. Viale

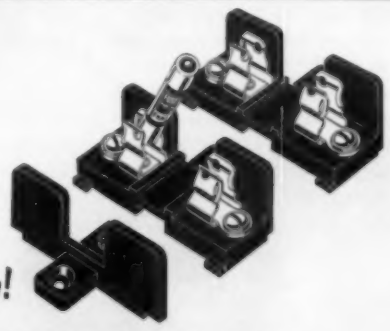
E. A. Viale
Vice President

EAV:s

"A Great Deal of Coil Replacement could be avoided, and Resultant Costly Shutdowns Eliminated by Protecting Solenoids *with* FUSETRON FUSES."

E. A. Viale, VICE PRESIDENT
DETROIT COIL COMPANY

Protecting solenoids or other electrical equipment with FUSETRON Fuses—gives you greater safety, dependability and money-savings!



New!

The BUSS Add-On Fuse Block for the protection of solenoids or Small Motors on Multi-Circuit Equipment

The BUSS Add-On fuse block makes it easy to protect equipment of any kind where a number of solenoids or motors are used.

Blocks are made up of single pole fuse blocks that interlock into a unit fuse block of any number of poles.

Poles may be added or removed . . . to either end of assembled fuse block. This makes it simple to have a fuse block of just the number of poles needed and to fit the block to available space.

Each fuse can be used as a circuit disconnect.

Specially designed fuse clips permit one end of fuse to be removed from clip and fuse raised to right angle to block where it is held firmly in position — see picture above.

When working on machine this makes it quick to identify circuit that is open — and it assures that proper fuse will be put back in right circuit.

Write for BUSS Bulletin BL-1.

BUSS and FUSETRON fuses are available to fit these fuse blocks in ampere sizes up to 30 and for voltages up to 250. Write for BUSS Bulletin SFB.

FUSETRON dual-element fuses provide 10 point protection against electrical troubles—unlike circuit breakers or ordinary fuses which, except in rare cases, protect only against short-circuits.

Fusetron Fuses remain safe — with no maintenance or recalibration required. They are calibrated at the factory by engineers. Once properly installed, they require no inspection and resulting downtime necessary on mechanically operated devices. There are no hinges, pivots or contacts to stick or get out of order. Dust, corrosion or oxidation cannot increase a Fusetron fuse's capacity or lengthen its blowing time.

After years of inactivity, a Fusetron fuse will give the same safe, dependable protection if called upon to open as it would have on the day it was installed.

For more information, write for . . . Bulletin FIS on Fusetron Fuses.

Bussmann Mfg. Division, McGraw-Edison Co., St. Louis 7, Mo.

159

Play Safe! Install Fusetron dual-element fuses throughout entire Electrical System.

FUSETRON BUSS — McGRAW EDISON — BUSSMANN MFG. DIVISION · St. Louis 7, Mo.

No complaints and less maintenance . . .

Troubles With Acid Fumes

A FINISHING plant recently experienced maintenance headaches with nitric and hydrochloric acid fumes exhausted from textile print roll plating operations. Improper discharge had resulted in excessive maintenance on shafts, bearings, supporting framework, etc. The above photo (left) shows fume attack on fan and component parts. Note particular damage to gutter, which was located near exhaust point.

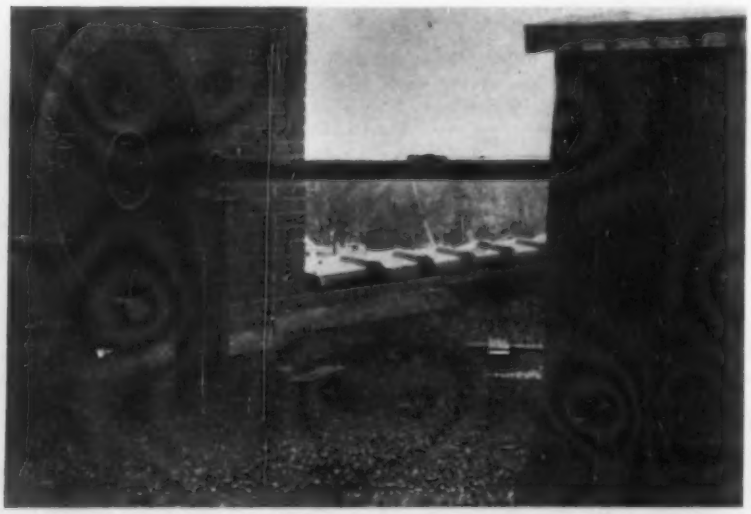
Fumes were exhausted by a 14-in. diameter centrifugal fan from hood over acid bath (right photo) into a type 316 stainless steel duct connecting the inlet to the opening in the brick flue. A stainless steel vertical discharge duct dissipated the acid fumes over a 12 ft high wall.

Owners of cars parked near one side of the plant began to complain of damaged paint finish and a check by plant engineering personnel indicated that this damage undoubtedly resulted from improper discharge of acid fumes.

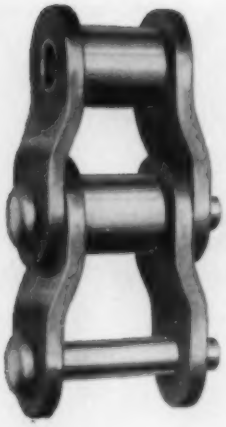
Washers, filters and other remedies were tried without success. Detailed investigation revealed that the fan and ducts were condensing the moisture in the air and fumes from the etching room. The acidified condensate was apparently being picked up by the fan and exhausted as a mist.

New System — Steps were immediately taken to construct an all brick flue and a 4 ft diameter axial flow fan with rubber coated

(*Continued on Page 96*)



New 4-ft axial flow fan with rubber coated blades now pulls exhaust from large brick flue, also protective coated. Exhaust is now relatively dry.



Steel Thimble Roller Chain—If you are driving a mixing drum or other equipment at an inclined angle, you can cut wear on chain drive by using this Jeffrey "offset" STR type.

Don't let work-horse appearance fool you . . . chain is a *precision* product. Its tensile strength, fatigue limit and resistance to wear affect the performance and life of *the equipment you make.*

Jeffrey chain is engineered to provide maximum strength with minimum weight, but with ample reserve strength to withstand sudden and heavy overloads.

Jeffrey chain makes good products better!

STR Hollow Pin Chain conveys bread through bakery ovens on smooth-running rollers. Conveniently spaced hollow pins provide an easy method for attaching trays or other fixtures.

Steel Knuckle Chain—Movable packer plate inside this cylindrical refuse truck is operated by using Jeffrey chain as a tension element and driving chain from the truck power takeoff.

Jeffrey engineers will help you design for most efficient use of power and longer lasting power transmission and conveying assemblies.

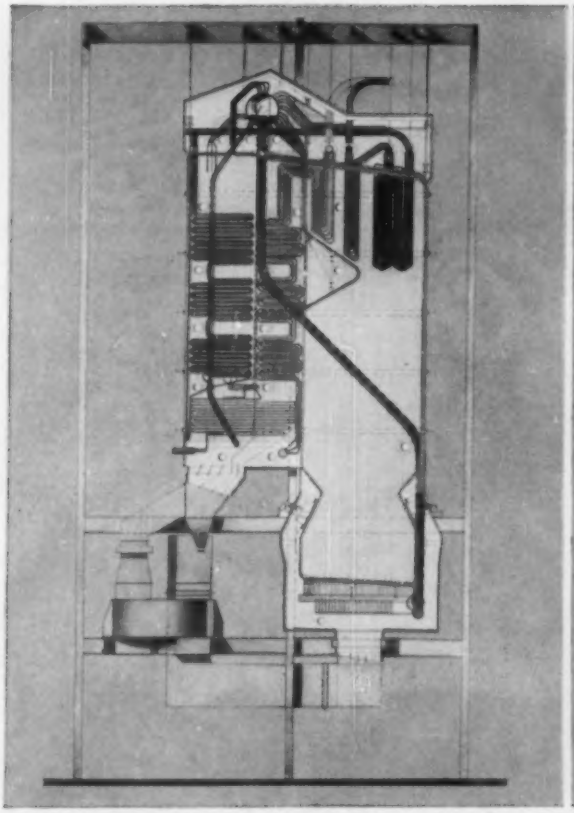
Here are some of the many types of equipment for which Jeffrey chain has been specified:

- Bakery equipment
- Bottling machinery
- Chemical processing
- Coal washers and jigs
- Conveying, loading, unloading and piling machinery
- Concrete mixers and pavers
- Cranes and shovels
- Earth and rock drilling units
- Elevating graders
- Excavators and trenchers
- Farm machinery
- Food machinery
- Glass batching
- Ice making units
- Industrial ovens
- Lumber and sawmill machinery
- Mining machines
- Pickling and plating machines
- Portable gravel plants
- Refuse collection trucks
- Road rollers
- Steel mill machinery
- Units for washing and drying materials

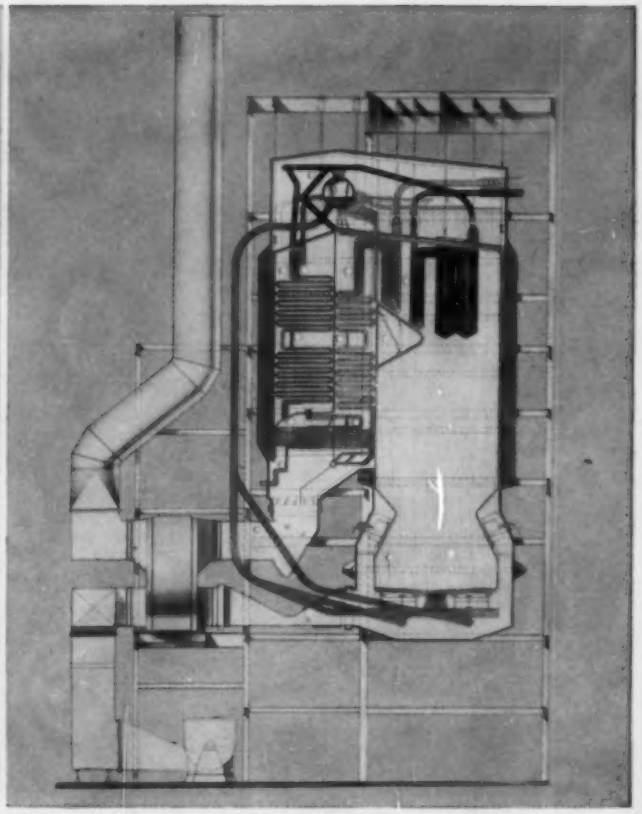
The Jeffrey Manufacturing Company, 898 North Fourth St., Columbus 16, Ohio.

CONVEYING • PROCESSING • MINING EQUIPMENT... TRANSMISSION MACHINERY... CONTRACT MANUFACTURING

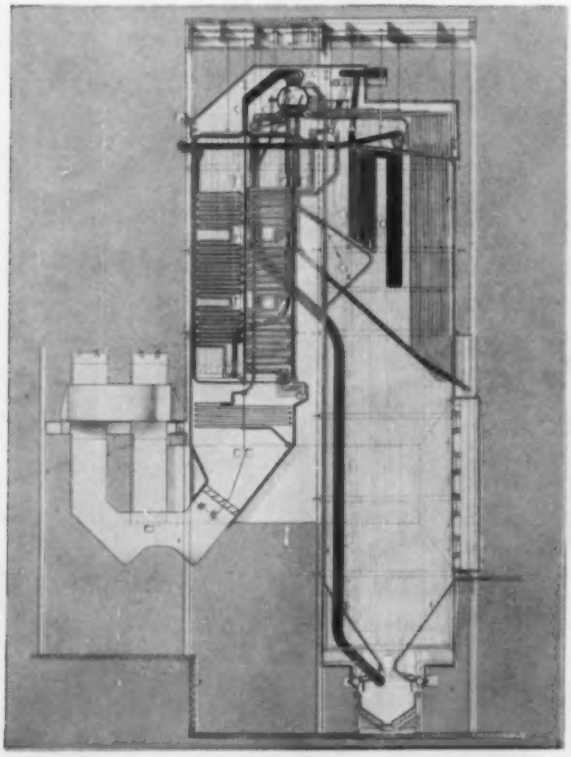
JEFFREY

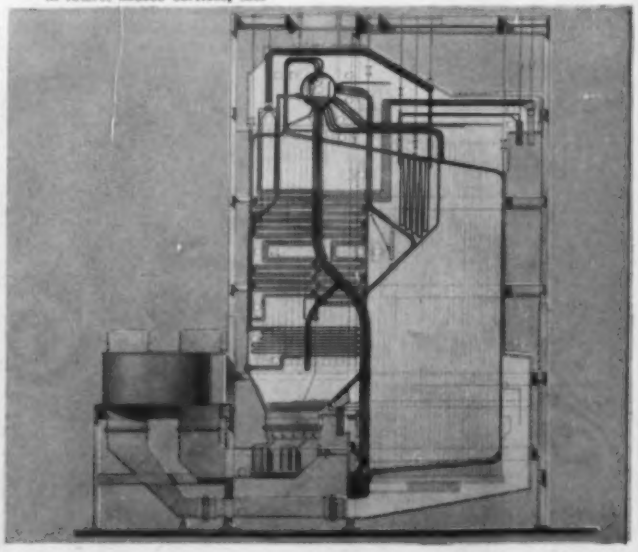


TURBO FURNACE Reheat Unit for **Florida Power Corporation** has capacity of 600,000 lbs/hr. 1750 Psi, 1000/1000 F. Fuels: oil, gas. Could convert to coal with minimum outage. **Black & Veatch.**



This Riley **TURBO FURNACE** Reheat Steam Generator for **Dallas Power & Light Company** is pressurized, has a steam capacity of 1,200,000 lbs/hr. 1005/1005 F. 2125 Psi. Will burn gas and oil initially and convert readily to lignite, coal in future. **Ebasco Services, Inc.**





This 350,000 lbs/hr. Gas Fired Reheat Unit is operating at **Central Louisiana Electric Company's** Teche Power Station. A duplicate is being installed at Coughlin Station. 1650 Psi, 1005/1005 F. Fired by Riley Intertube Burners. **Sargent & Lundy.**

This 690,000 lb/hr. Reheat Unit is now on the line at R. S. Wallace Station of **Central Illinois Light Company** 1650 Psig 1000/1000 F. Fuel: Central Illinois coal. **Commonwealth Associates, Inc.**

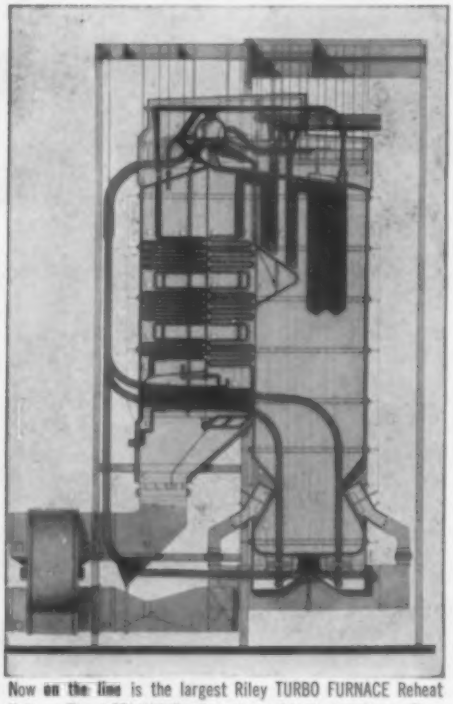
RILEY

A LEADER IN THE DESIGN, MANUFACTURE AND ERECTION OF PUBLIC UTILITY CENTRAL STATION STEAM GENERATING UNITS

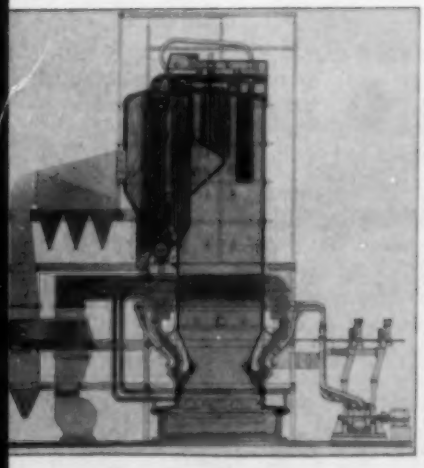
RILEY STEAM GENERATING UNITS HAVE PRODUCED AN OUTSTANDING RECORD FOR DEPENDABILITY AND EFFICIENCY

Over the years Riley Boilers have produced an outstanding record of performance for their users. This record has in turn supplied Riley a large reserve of satisfied customers who consistently install Riley boilers as their production facilities expand. Today, Riley is considered one of the foremost suppliers of steam generating equipment in the world. Riley boiler designs cover every steam capacity and pressure required for modern industrial power plants and public utility installations. A complete Riley Steam Generating Unit includes boiler, superheater, reheater, economizer, air heater, waterwalls and steel clad or pressurized setting. With fuel burning equipment selected from Riley's wide range of fuel burning products users are able to purchase complete steam generating units fabricated, erected and serviced under a single contract without divided responsibility. Whatever your steam and fuel burning requirements may be, you can rely on Riley to provide a highly efficient unit that will assure satisfactory and dependable service for many years.

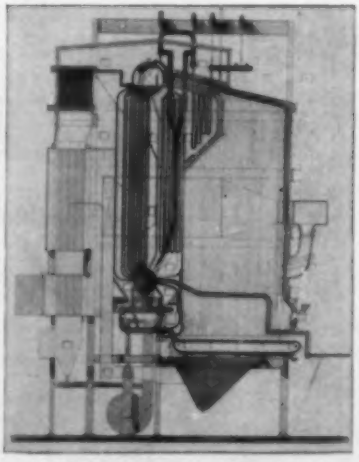
RILEY STOKER CORPORATION
WORCESTER, MASSACHUSETTS



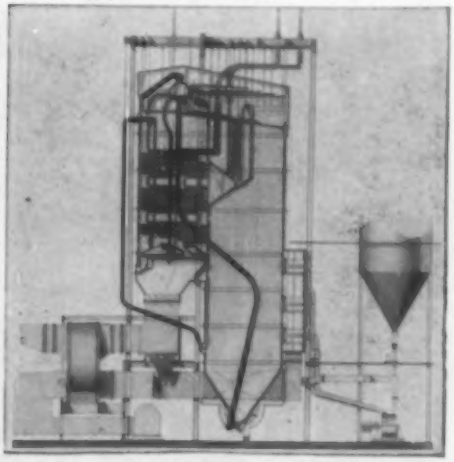
Now **on the line** is the largest Riley TURBO FURNACE Reheat Unit — The 1,550,000 lbs/hr unit at Sterlington Steam Electric Station, **Louisiana Power & Light Company;** designed for gas, oil; fluid coke, coal, lignite in future. **Ebasco Services, Inc.** A 1,650,000 lbs/hr unit designed for coal will be installed at Little Gypsy Steam Electric Station.



hree 500,000 lbs/hr. TURBO FURNACE Boilers are successfully firing Fluid Coke for **Delaware Power & Light Co.** t Tidewater Oil Company's Flying "A" Refinery.



This 450,000 lb/hr Spreader Stoker Fired Riley Unit is one of the largest lignite burning boilers in the world. 1025 Psi., 905 F. **Montana-Dakota Utilities. Ebasco Services, Inc.**



This Riley Reheat Unit is constructed outdoors at **Minnesota Power & Light Company's** Clay Boswell Station. Fired by Riley Pulverizers and coal, gas, oil Burners; has patented Riley Single Header Hopper. **Ebasco Services, Inc.**

Continuity of service . . .

Electrical Control *CHECK LIST* for Industrial Automation Systems

By A. W. FRANKENFIELD
Senior Electrical Consultant—Retired
E. I. du Pont de Nemours & Company
Wilmington, Delaware

THE TREND to automation, while more widely publicized in the past few years, is approximately 20 years of age. This trend will continue and become more and more self-evident by the mere physical size of automated equipment.

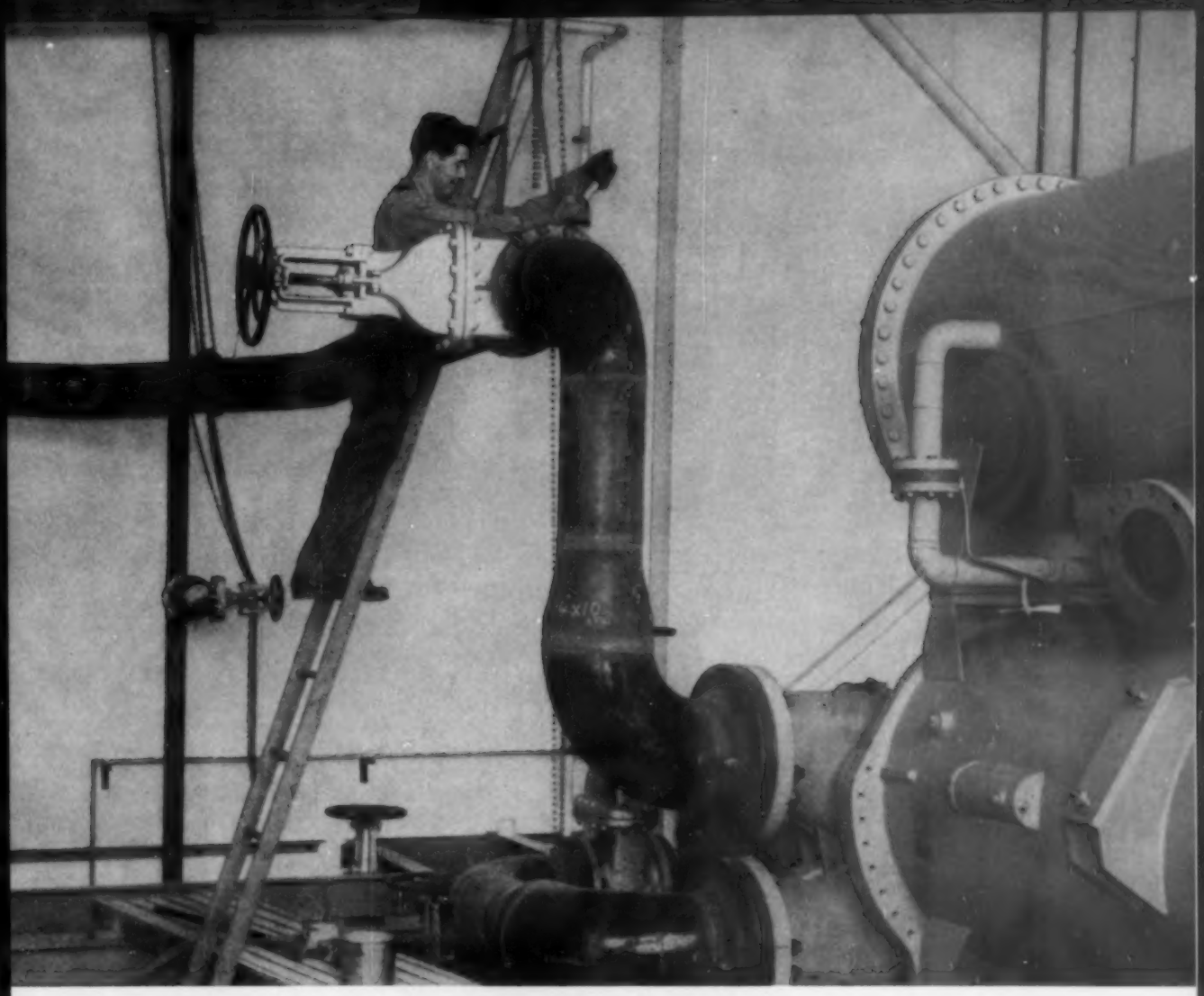
Electrical controls are the heart of all automation systems and depending upon the substance involved, you must control such processes involving the transmittal of power to control tension, speed, pressure and/or thickness.

Since continuity of service is required for most automation systems, the electrical controls should be checked annually, possibly more frequently, depending on the frequency of operation.

A. Contractors

1. Check for contact chatter which may be due to dirty or poor contact in pickup circuit.
2. Check wipe and pressure on interlock contacts.
3. Check for proper tip pressure, loose connections, any signs of overheating of contact tips on all three poles (in 3-phase contractors).

   (Measuring the millivolt drop across the current carrying connections will indicate poor contact pressure and overheating.)
4. Remove copper oxide from contact tips as this is a common cause of overheating.
5. Remove any sulphide formations from contacts (not silver oxide) as this builds up resistance.
6. Clean dust from contactors by means of vacuum cleaners rather than by high pressure air. (Air hoses only scatter dust and dirt to other electrical equipment nearby.)
7. Correct poor alignment of contacts.
8. Examine flexible shunts for corrosion and wear. To make sure they are in good condition, flex and twist slightly.
9. Check arc chutes for any damage. If burnt through, replace to prevent phase-to-phase faults or burning out of pole pieces with the arc. Minor breaks can be repaired by special putty cement.
10. If contactors are oil immersed, check for oil level and sludge formations. Check oil for dielectric strength. (Use discs 1-in. in diameter spaced 0.1-in. apart. The minimum strength considered safe for operation is between 16 and 22 kv.)
11. Check gaskets for damage or leakage.
12. Check the enclosure for any evidence of dripping liquids. (Correct by shielding or relocating.)
13. Check for binding or sticking.
14. Check for wear allowance on contactor tips.



SPANG Steel Pipe carries corrosive Trichlorethylene for the Ford wind tunnel, where engineers conduct experiments in aerodynamics and radiator, ventilation, and air conditioning development.

SPANG Steel Pipe carries corrosive brine in Ford Motor Company wind tunnel

160°F above zero to −20°F . . . those are the conditions under which the Ford automotive testing wind tunnel operates. There can be no room for material or mechanical failure here.

In this installation, SPANG Steel Pipe carries corrosive brine in the refrigeration machinery, which produces extreme weather conditions for testing and developing radiators and air conditioning systems as well as aerodynamics testing.

SPANG Steel Pipe is manufactured under strict *quality-control* conditions and thoroughly tested and inspected to assure you of *top-quality* installations and performance.

For your next job: make it steel pipe . . . make it SPANG.

Plumbing Contractor:
James & Roach, Inc., Detroit, Michigan

SPANG CW STEEL PIPE

THE NATIONAL SUPPLY COMPANY

Subsidiary of Armco Steel Corporation

TWO GATEWAY CENTER, PITTSBURGH, PA.

CHECK-LIST (Continued) for Industrial Automation Systems

15. Lubricate where necessary per manufacturer's instructions.

B. Contactor Coils, Relays, Solenoids, Brakes, Etc.

1. Measure control circuit voltage. (Coils of a-c contactor are designed to operate satisfactorily over a range of 85 to 110% of rated voltage and on d-c contactors from 80 to 110%.)
2. Remove all dirt and dust with a vacuum cleaner.
3. Check for excess heating. Look for discoloration, odor, charred insulation. Temperature should read 85 C rise by resistance in ambients up to 40 C or about 65 C by thermometer on the coil surface. (For encapsulated coils check manufacturer for temperature recommendations.)
4. Check for corrosion and wear of any shunts, springs, etc.
5. Check for binding or sticking of any moving parts.
6. Check for excessive wear on the coil or spool due to loosened magnet frames.
7. Check for loose connections.
8. Measure coil currents. (If higher than rated, check for excessive gap in the magnetic circuit.)
9. Excessive noise in a-c magnets due to loose laminations, to poor contact pressures, to broken pole shader, to magnet faces not being true.
10. Take out the control circuit fuses and polish the contact surfaces of fuses.
11. Check for any moisture in the coil.
12. Check for operation sequence of various interlock circuits.

C. Thermally Operated Devices

1. Check condition of heating elements.
2. Check for proper operation of latching mechanism trip.
3. Check for ambient temperatures of relays and motor. If different, condition should be corrected.
4. Check contact pressure by noting millivolt drop.

D. Timing Relays

1. Check circuit voltages. (Motor voltage if motor operated.)
2. Check for mechanical binding or sticking.
3. Check for worn shims, weak springs.
4. Check time constants. Product of resistance and capacitance in ohms and microfarads respectively or the ratio of L/R where L is in henries and R in ohms.
5. Check for dirt in air gap or gum around plunger shaft of pneumatic relays.
6. Check for oil and condition of oil (if damping devices use oil).

E. Regulators

1. Clean off all dust and dirt by means of vacuum cleaners.
2. Check for excessive heating.
3. Check for loose connections around resistors, capacitors, coils, tubes, transformers.
4. Check for corrosion of metal parts.
5. Check resistances of rectifiers.
6. Check capacitance of capacitors.
7. Check plate voltages, grid voltages, cathode voltages, voltages across bias circuits, voltages of resistors, capacitors, and wave forms with an oscilloscope and compare with readings that were taken when regulator or controller is operating satisfactorily, i.e., with readings recommended by manufacturer.

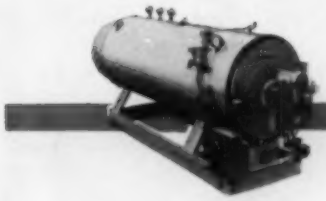
F. Switches (Limit Switches, Selector Switches, Pushbuttons, Knife Switches, Etc.)

1. Make sure they function freely by manually operating the switches.
2. Clean off all dust and dirt.
3. Check for excessive arcing in opening.
4. Check for loose connections.
5. Check for contact pressures and wear allowances, per manufacturer's recommendations.
6. Check for any corrosion.
7. Check for condition of barriers or arc chutes.
8. Check oil levels and condition of oil if oil immersed.
9. Check for any damage of gaskets.
10. Check for liquid dripping on enclosure.
11. Lubricate switches where recommended.

G. Tachometer Generators (Monthly)

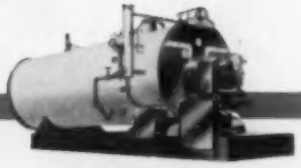
1. Clean off the film from commutator with No. 3/0 carborundum paper.
2. Examine each brush for wear. Replace if crack-

WHICH TYPE OF PACKAGED BOILER is best for your installation?



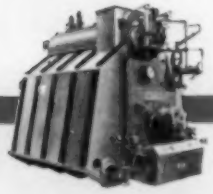
TYPE "C"

Horizontal four-pass fire tube packaged boiler for installations where space is limited. Capacities from 20 to 350 bhp. Fully automatic, burning oil, gas or both. Equipped with dependable Superior Rotary Burners and induced draft. Pressures to 250 psi. or for hot water operation. Write for Bulletin 1011C.



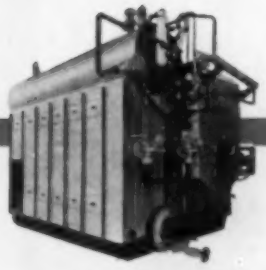
TYPE "F"

Horizontal four-pass fire tube Type "F" units are fully automatic, burning oil, gas or both. Capacities from 20 to 600 bhp. Pressures to 250 psi. or for hot water. Built-in induced draft for clean, quiet operation. Write for Bulletin 1011F.



TYPE "AS"

Completely packaged water tube boilers for steam capacities as low as 4000 lbs. of steam per hr. Fully automatic, burning oil or gas or both. Design pressure 190 psig. Rear-mounted mechanical draft fan, air-cooled furnace floor and firing front. Maximum capacity 13,000 lbs. of steam per hr. Write for Bulletin 1011S.



TYPE "D"

Completely packaged water tube boilers for capacities from 8,000 to 60,000 lbs. of steam per hr. Wide selection of burner and control arrangements. High, rear-mounted mechanical draft fan for quiet operation; uncluttered firing front. Write for Bulletin 1011D.

YOU'LL GET AN UNBIASED ANSWER FROM: SUPERIOR

Make your selection from the line that includes so many different models for capacities as low as 20 bhp., and as high as 60,000 lbs. of steam per hour. Water-Tube units, Fire-Tube units. Units that burn light oil, heavy oil, and gas.

Only Superior Combustion Industries makes them all as complete packages giving you and your consulting engineer freedom to choose a unit which closely meets the requirements of your installation.

THE WORLD'S MOST COMPLETE LINE OF FULLY PACKAGED BOILERS...

Specialists in PACKAGED BOILERS... exclusively

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

SUPERIOR
PACKAGED BOILERS

CHECK-LIST (Continued) for Industrial Automation Systems

ed, broken or worn to a length of one fourth inch or less.

3. Check spring pressure on brushes.
(Should read anywhere from 3.5 to 10 lb depending on type of tachometer generator.)

Every Six Months

1. Sleeve bearings should be re-oiled with 15 to 20 drops of electric motor oil.

Every Two Years

1. Disassemble generator, replace bearings.
2. Clean any overflow holes at commutator end.
3. Check running deflection of couplings.
(Should not exceed manufacturer's recommendation.)
4. Check axial force on the rotor.
(Should not exceed manufacturer's recommendation.)

The steadily increasing cost of manual operation and the need for higher speeds in closely controlled automation systems require highly reliable and maintenance free equipment for definite periods of time.

The cost of shutdowns will more and more rise to astronomical figures as automation further develops and maintenance forces will have to be decidedly up-graded to maintain production. Therefore, it is essential that maintenance schedules be closely followed to secure the ultimate in quality and production.

Lubrication Cart

EQUIPMENT will perform in proportion to the amount of service given it. For this reason, preventive maintenance has become vital in manufacturing operations today.

We have a rather large plant — over 200,000 sq ft devoted to manufacturing alone, and millions of dollars of costly manufacturing facilities, all of which require specialized maintenance. To accomplish the job of oiling and greasing this vast amount of machinery, we utilize the Stewart Warner Corporation grease and oil cart most advantageously.

All the necessary tools, material and equipment are stored on this mobile cart for complete greasing and oiling of our machines and equipment.

By properly scheduling our preventive maintenance program, we are all able to avoid many costly breakdowns and have considerably reduced our production downtime.

By H. E. MUNGAN, Manager — Plant Facilities, General Electric Company, Lynchburg, Virginia.

Flagpole Mounting

NEARLY every plant has a flagpole on which are displayed the National Colors, the company flag, the Safety Cross and other banners.

The flag halliard sometimes fouls in the upper pulley, and at intervals the pole requires repainting — both servicings require either the summoning of a ladder truck or dismounting the pole. One plant found lowering the pole the easier solution.

The base of the pole itself is welded into the side of a short length of 24-in. pipe whose ends are sealed — for appearance's sake — with dished heads. The 24-in. pipe has been used to form a semicircular depression in the top of the concrete base on which the pole is to be mounted, and after the concrete is cured the pipe is fastened in place with two 2x⅜-in.

steel straps, formed to fit the pipe diameter and bent to lie flat along the concrete. Bolts at both ends of the strap allow it to be cinched tightly around the pipe, holding it firmly in place.

By loosening the nuts on the hold-down bolts, the pipe base and its pole may be rotated until the pole lies horizontally, where it may be serviced without special equipment. The pole is again set upright after the required work is completed, and the pipe base repainted to cover breaks made in its coating by the lowering operation.

good for another 50 years... it's a Green fan!

We had a phone call the other morning. Nothing unusual about that—people do call us. This caller said he had an old Green fan, and wondered if we'd care to look it over. Figured we might have a buyer for it.

Well, it turned out that this was one of our earliest fans, the sixth fan we made, in fact. Every bit of it, fan, shaft and housing, was designed and made in our plant in 1903. Now, 1903 is so long ago even the name of our town has since been changed from Matteawan to Beacon.

For 55 years this Green fan had been used in a lumber mill for exhausting shavings from a planer. The building in which the fan was housed was torn down early in 1958. Everything but this Green fan had been carted away.

We went over that fan inch by inch, and bought it for ourselves to keep as an example of Green's workmanship.

Know something? It could be started up today, with no repairs, and we feel it would run satisfactorily for another 50 years. Just goes to show when Green builds a fan, well—it's built!

Green

THE GREEN FUEL ECONOMIZER CO., INC. BEACON 3, NEW YORK

Centrifugal Pump Clinic

QUESTIONS & ANSWERS — Conducted for SPI readers by **Igor J. Karassik**, consulting engineer and assistant to vice president; and **W. C. Krutzsch**, assistant chief engineer of the Harrison Division, Worthington Corporation.

Question . . .

WE ARE considering the application of a centrifugal pump which will be very similar to the "tail pump" serving a barometric condenser. In other words, it will draw its suction from a vessel under vacuum and the available NPSH will be the actual submergence to the pump centerline. For the particular conditions encountered, we have been advised that the pump will require approximately 15 ft of NPSH.

Because of our desire for the simplest possible installation, we have considered the pump service to be suitable for "submergence control," that is operation of the pump in the break, with the inflow to the vessel regulating the available submergence and, hence, the pump delivery — just as in the case of typical condensate installations.

We have been discouraged from using "submergence control" in this case and the manufacturer has recommended that a throttling valve be used in the pump discharge, operated by means of a float control.

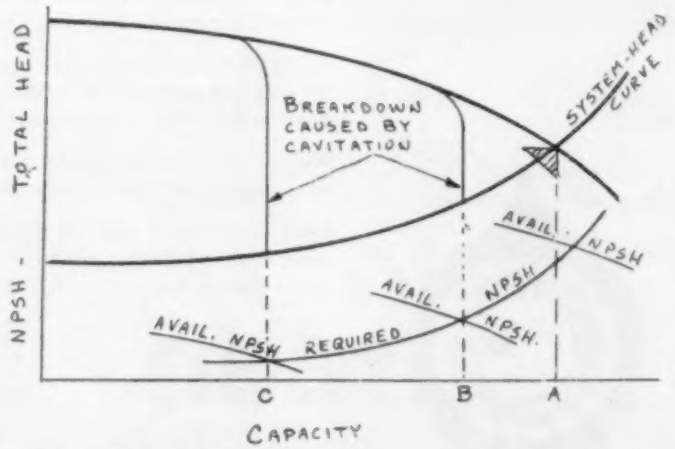
We would like to know why "submergence control" is suitable for normal condensate service but not applicable here.

Answer . . .

NPSH control or submergence control, as it is commonly called, is inherently automatic and since it requires no control equipment, it has been used very widely in steam power plants to regulate the delivery of condensate pumps. The typical performance curve for a pump operated on submergence control shows the system-head curve, the NPSH required by the pump and the NPSH available at each of three capacities. At capacities "B" and "C," the available NPSH is exactly equal to the required NPSH. This will always be the case for any capacity smaller than that at which the "uncontrolled" head-capacity curve intersects the system-head curve, since in this region the level in the hotwell will be pumped down until the available NPSH will have been reduced to just equal the NPSH required by the pump, after which it cannot be reduced any further.

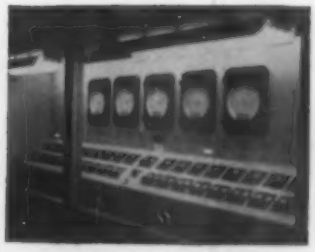
Thus, when a pump is operated under "submergence" control, the pump is operating in the break — i.e. cavitates — at all capacities less than "A" The pump may be more or less noisy at all capacities below "A," depending on a large number of factors involving design and operating conditions. However, the cavitation which occurs is generally not severely destructive in nature in the case

(*Continued on Page 62*)



Condensate pump performance curve showing how capacity is controlled by means of "submergence" control.

HAGAN NEWSLETTER
Behind the Panel



HOW AUTOMATIC ARE AUTOMATIC CONTROLS?

The answer depends a lot on the reliability factor in the system, and on how well the various control elements are integrated. A great many control systems are designed to operate on full automatic only when the process is within normal operating range. In applications where the process can vary widely, or where operators must be relieved of control supervision during abnormal conditions, true automatic control is desirable. Hagan systems are designed to accomplish this; for example:

OUTDOOR BOILER CONTROL SYSTEM STAYS ON AUTOMATIC DURING GENERATOR TRIP-OUT: a new outdoor utility station in the Southwest experienced a generator trip-out, and in the excitement, the 3-element feed-water control system was left on automatic. Inspection of charts after the difficulty was overcome showed that the feedwater system had maintained proper drum level throughout the two hour shut-down, even though the system went through the complete shut-down, start-up cycle.

SOAKING PITS NEVER OPERATED ON MANUAL CONTROL: on a new installation of two batteries of 3 pits, the heaters are instructed never to operate on manual control. In case of control malfunction, the pits are shut down until the system is repaired. In a year of operation, this policy has resulted in the loss of only four pit hours production time. Pit bottoms have not built up excessively, indicating close control of combustion and absence of ingot washing. (Item A-1)

FIRST SOLID STATE ELECTRONIC BOILER CONTROL SYSTEM

Operational magnetic amplifiers, used as basic control elements in the combustion, feedwater, pump recirculation and steam temperature control systems, will be installed on a new 1,260,000 lb/hr boiler at a Southern utility. The Hagan proposal--for the first solid state electronic boiler control--was selected by the utility in competition with two other electronic systems that did not achieve the reliability inherent in a solid state system. (Item A-2)

ELECTRONIC TEMPERATURE CONTROLLER SENSES 0.000001 VOLT CHANGE

Ultrasensitive, the Hagan PowrAmp Temperature Controller is responsive to thermocouple output fluctuations of one-millionth of a volt. Designed for precise temperature control in situations where either the heater or the product temperature can change rapidly, the Controller provides adjustments for proportional band, reset, and rate action. While this is a new instrument, it has already been proven in action. It was selected for the critical job of controlling glass fiber drawing dies operating at 1600F and it is limiting die temperature fluctuation to less than 0.25F. The Controller provides stepless regulation and will handle up to 330 kva through saturable reactors. (Item A-3)

NEW POWRLOG OFFERS LOW-COST TEMPERATURE MEASUREMENT OR CONTROL

Our systems engineers wanted a rugged, low-cost remote recorder for process measurement in industrial applications. Once we decided that the right way to minimize maintenance was to make use of unitized construction, the acorn we had been asked for rapidly became a full fledged oak. We ended up with an instrument that will measure any function that can be converted into an error voltage, either AC or DC, and then convert these voltages into mechanical movement that may be used for driving a recorder, indicator, integrator, pneumatic transmitter or a controller.

Utilizing a unique amplifier that is adaptable to a wide variety of applications by means of plug-in input boxes, the new HAGAN PowrLog is particularly well suited for the remote measurement and/or control of temperature with either thermocouples or resistance bulb thermometers. The components of this versatile instrument have been selected for accuracy and high reliability--result--maintenance has been reduced to a new low. (Item A-4)

HAGAN CHEMICALS & CONTROLS, INC.
Hagan Building, Room 700, Pittsburgh 30, Pa.

If you would like more information on any of the above items, check the appropriate box below.

☐ Item A-1 ☐ Item A-2 ☐ Item A-3 ☐ Item A-4

Gulf makes things run better, with—

NEW GULFCROWN

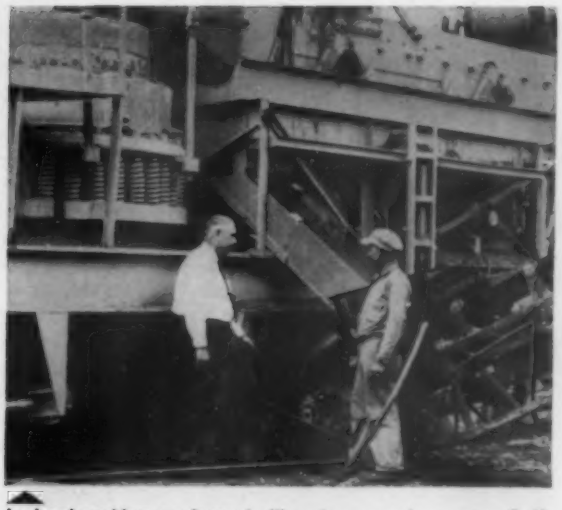
Here's a multi-purpose lithium base grease for bearings in heavy duty service.

It's a completely new bearing grease that effectively lubricates bearings operating under high loads, shock loads and with oscillating motion.

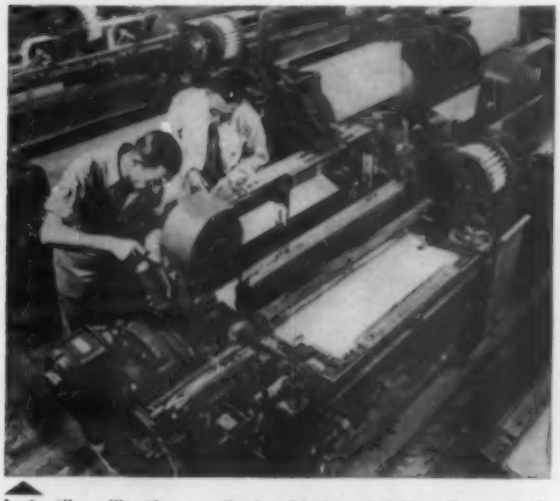
New Gulfcrown Grease E.P. will give you plenty of proof that Gulf makes things run better. It resists heat, cold, moisture and mechanical breakdown. It has excellent oxidation stability and protects against corrosion.

You'll find that this new grease pumps freely at 0°, yet stands up at temperatures to 250° F., and even higher under certain conditions.

New Gulfcrown E.P. is an unusually versatile multi-purpose grease. For example, it gives excellent results in the lubrication of heavily loaded trunnion bearings . . . steel mill work rolls and table rolls . . . sliding dog clutches . . . spiral gear boxes . . . Banbury mixers . . . the bearings, cams and gears in textile looms . . . and



In hard-working equipment, like stone crushers, new Gulfcrown Grease E.P. withstands extremely high shock loads in grease lubricated bearings.



In textile mills, the excellent oxidation stability of new Gulfcrown Grease E.P. makes it the ideal lubricant for loom bearings, cams, pick balls and gears.

In steel mills, new Gulfcrown Grease E.P. will successfully withstand the high temperatures and extreme pressures encountered in the lubrication of work rolls and table rolls.

GREASE E.P.

a host of other heavy-duty industrial applications.

Gulfcrown E.P. can be used for electric motor bearings, fans, pumps and for nearly every type of application. Can be applied through centralized systems or by gun. Available in NLGI consistencies 0, 1 and 2.

Find out how Gulfcrown E.P. can improve your operation and help you get lower maintenance costs. Call your Gulf Sales Representative at the nearest Gulf office. Meanwhile, mail coupon for new booklet.

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Dept. DM, Gulf Bldg., Pittsburgh 30, Pa.

Please send booklet on new Gulfcrown Grease E.P.

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BP-15209

CENTRIFUGAL PUMP CLINIC

of condensate pumps.

Cavitation

To understand the effect of "submergence" control on pumps operating with considerably higher values of NPSH, it is necessary to analyze just what the mechanics of cavitation consist of. Cavitation is a generic term which covers the entire scale of phenomena taking place in and about an impeller when it is operated under conditions where local pressures fall close to or below the vapor pressure of the liquid pumped. The term covers not only the actual formation of vapor bubbles, but also the limitation on capacity, the incidental noise and the destructive effect on the impeller metal.

This energy level is indicated by the NPSH available. While this is generally expressed simply in feet of liquid, its actual units are foot-pounds per pound. In other words, the NPSH available is a measure of the available energy per pound of the liquid pumped. Thus, in a condensate pump operating at 3′ NPSH, the collapse of the vapor bubbles occurs at an energy level of 3 ft-lbs per pound and the intensity of the shock wave of which we spoke is determined by this energy level.

All these effects, we repeat, originate in the formation of vapor bubbles when liquid pressure drops just below the vapor pressure. This is followed by the recollapse of these bubbles to liquid when pressure increases to a point just above the vapor pressure. The cause of cavitation damage is the shock wave set up by the collapse or "implosion" of these bubbles.

In a pump, these bubbles form at the inlet to the impeller when the available NPSH becomes equal to or slightly less than the required NPSH. The bubbles are carried along in the liquid stream as it passes through the impeller, until they reach a point where sufficient head has been generated to just exceed the vapor pressure. At this point, the bubbles collapse.

It is at this point where damage becomes evident. It cannot occur upstream of this point, since in that region there exists a mixture of liquid and vapor and the energy of the shock wave is dissipated in alternate compression and expansion of the vapor. But in the pure liquid phase, the shock wave is propagated through the liquid, until it is arrested by the surface of the impeller. If at the point of arrest, the shock wave possesses sufficient energy, it actually displaces a minute particle of material from the surface of the metal. Frequent and repeated occurrence of this process produces the pitting which is the usual symptom of cavitation. The degree of pitting for a given degree of cavitation is of course related to the relative "toughness" of the metal used in producing the impeller. In addition, there may take place a side-effect involving a chemical reaction of the metal to any gas held in solution in the liquid and liberated by the reduction in pressure.

"Energy Level"

That serious pitting occurs in pumps which cavitate at what may be referred to as "usual" levels of NPSH such as 15 or 20 ft is widely known. But it is a curious and much less known fact that condensate pumps operating on submergence control, work under essentially continuous cavitating conditions and yet do not usually

(*Continued on Page* 64)

Question . . .

WE HAD ordered a centrifugal pump driven by a 200 hp, 3600 rpm electric motor. It has been received with the pump dowelled to the baseplate, but with the motor left undowelled. Instructions received with the pump indicate that the driver dowelling is to be made in the field after final alignment. Why is it that the driver cannot be aligned with the pump at the factory and dowelled there?

Answer . . .

IT IS NOT practical to align drivers with their pumps at the factory prior to shipment and to have this alignment maintained with sufficient accuracy so that the unit can be started and operated satisfactorily without a final realignment in the field.

Baseplates of sufficient strength and rigidity with mounting feet and bolting on the units of sufficient size to permit operation without field realignment would be prohibitive in size and weight to the extent that they would not be acceptable to any customer.

Furthermore, the pump, the baseplate and the driver are generally subjected to such forces during shipment, when being mounted in place and during the piping up of the unit, that serious misalignment is introduced. This misalignment is frequently sufficient to cause coupling and bearing failures and, in some cases, even shaft breakage.

Thus troubles are almost impossible to avoid unless a final field alignment is made, after which the driver can be permanently dowelled to the baseplate.

If the pump is to handle high temperature liquids, the final alignment should take place with both pump and driver brought up to normal operating temperature.

This reasoning leads in many cases to having the driver shipped directly to the installation site, without first coming to the factory where the pump has been built. This practice saves on the cost of double freighting if the driver is not required for testing the pump. In such cases, the baseplate should not be drilled for the driver feet at the factory and the drilling should take place in the field, to avoid any error and the resulting inconvenience of re-welding the holes and their re-drilling.

How to get a "custom" pump at a standard price

Here's a new line of vertical centrifugal pumps easily tailored to your exact needs.

For process transfer or heavy-duty sump service, these pumps have features which assure long trouble free life with a minimum of maintenance.

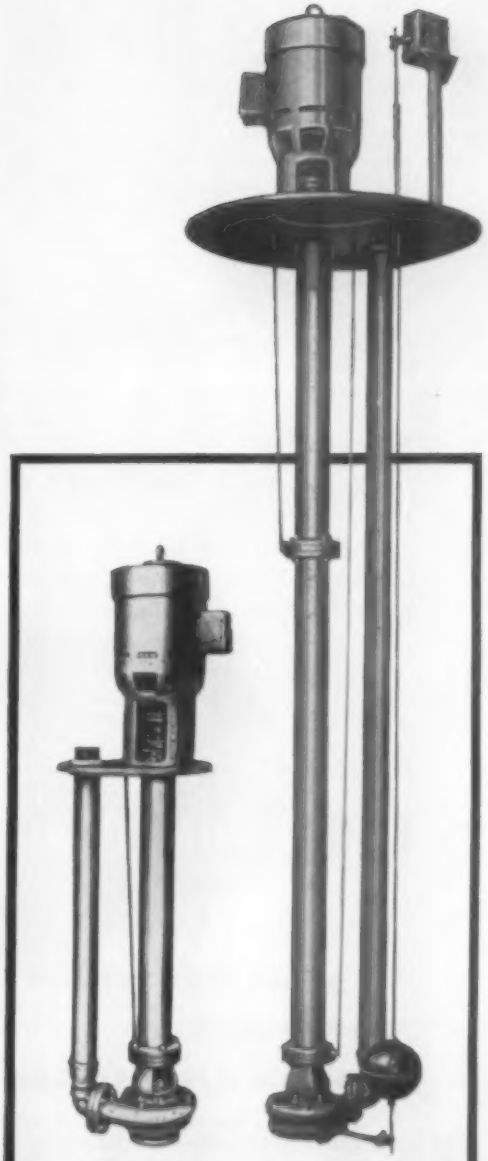
Because they're built from standard parts, delivery is fast and there is no premium charge for custom building. When you want to change pit depth or pump ratings, you merely replace necessary parts. Units may be adapted in the field. Shafts and pipe columns are available for any pump length from 2 to 20 ft. in 6-inch increments.

There are types for wet or dry pits, with capacities to 1080 GPM or heads to 290 ft. Vaporproof construction is available.

Complete details in Bulletin 726.2.

GOULDS PUMPS, Inc., Dept. SP-2, Seneca Falls, N. Y.
Main Office and Works

Branches and Representatives in all principal cities



Goulds Fig. 3173 Goulds Fig. 3171

GOULDS

PUMPS FOR INDUSTRY

CENTRIFUGAL PUMP CLINIC

suffer damage from this cavitation. There must, of course, be an explanation for this observed fact and the most logical explanation lies in the concept of "energy level" of the fluid stream. While this is by no means the only possible explanation for this phenomenon, and in itself may be only one of several contributing factors, it does lend itself to a rather ready explanation and is understandable without any detailed knowledge of pump design theory.

In a pump operating at 15′ NPSH, the energy of the fluid stream is five times as great and the intensity of the shock wave similarly greater. In view of this five to one ratio, it is not surprising that one of these instances causes no damage while the other one does. The difficulty, however, arises in establishing the limit of NPSH for non-destructive cavitation.

Despite the extensive literature on the subject of cavitation accumulated in the recent years, there is still a great scarcity of positive knowledge regarding the limiting factors of damage-free operation of centrifugal impellers under cavitating conditions. Most of the technical papers which treat this subject, deal with the fluid dynamics involved and develop various theoretical relations which — with the help of certain empirical coefficients — will yield approximate conditions under which cavitation may start. But whether operation under cavitating conditions will or will not have an abnormally destructive effect on the impeller, remains a matter of experience. We must consider that even the words "abnormally destructive" are subject to very wide interpretation.

What constitutes satisfactory life to one operator may be far from satisfactory to another. As a result, it becomes necessary to accept the fact that any limiting recommendations which may be presented here are strictly qualitative and subjective. They must be re-evaluated by the reader in the light of his personal experience and opinion.

The limits are undoubtedly different in every installation because of minor differences in pump design, materials of construction, character of the liquid and general characteristics of the system in which the pump is operating. Admittedly, in a rather arbitrary fashion, it has the practice of the writers to select a limit of 5′ NPSH for satisfactory life of a pump on submergence control. This limit may be considered as somewhat conservative, but will generally insure the installation against undesirable and unexpected difficulties.

LOOK FOR QUALITY

in your hot water generator...
look to FINNIGAN

Finnigan Hot Water Generators are engineered to give you large quantities of hot water for low operating cost. The finest materials, creative skill and quality construction assure efficiency in Finnigan equipment. These generators are fabricated from corrosive-resistant materials and contain copper removable-coil heating elements. Before leaving the plant, each generator must conform to ASME, API, U. S. Government and other specifications. "Fabricated by Finnigan" is your assurance of quality.
Finnigan builds hot water generators to your specifications. Call, wire or write today for complete information with no obligation to you.

TANKS, SMOKESTACKS, PIPING, WATER HEATERS, BREECHING, PLATE WORK.

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New Orleans 25, La., 4054 Thalia Ave.
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Stipp & Powell — S. C.

Stipp & Powell, Inc., Greenville, S. C., has announced that **Robert L. Kunz** will be associated with them as salesman. Mr. Kunz comes to Greenville from the Detroit, Michigan sales office of Buffalo Forge Co.

Stipp & Powell are manufacturers representatives, maintaining offices in Greenville, S. C. and Greensboro, N. C., serving the states of North Carolina and South Carolina. Among manufacturers they represent are: Buffalo Forge Co., Buffalo Pumps, Dollinger Corporation, Dravo Corporation, Penn Ventilator Co., Anemostat Corporation of America and Waterloo Register Co.

Bendix Filter — SE

Appointment of **Earl H. Smith** as sales engineering representative for the **Bendix Filter Division** in the southeastern part of the United States has been announced by F. C. Weyburne, General Manager, Bendix Filter Division, Bendix Aviation Corporation.

Mr. Smith resides in Bahama Shores, St. Petersburg, Florida, and will provide sales and application engineering assistance to users of high performance filters in the aircraft, missile, automotive, agricultural and industrial machinery industries in the Florida, Georgia and Alabama areas.

I-T-E — Charlotte

The I-T-E Circuit Breaker Company, Philadelphia, has opened a new district office in Charlotte, N. C., to consolidate sales in North and South Carolina of five of its divisions.

The new office, at 215 East Morehead Street, replaces the company's Columbia, S. C., district office. It also takes over sales of I-T-E products formerly handled by E. H. Gilliam Company, manufacturers representative in Charlotte.

John W. Harrawood, head of the Columbia office, becomes district manager of the new office. Harrawood, 35, joined I-T-E in 1950 and worked in the headquarters sales department until 1952, when he was transferred to the St. Louis district office as a field application engineer. He was appointed Columbia district manager in 1958.

PROTECTION AND BEAUTY, TOO

There's No Other Paint Like Subox

...Because Subox is the only paint in the United States made with chemically-active lead-suboxide. Unlike the pigments of inert paints, lead-suboxide changes chemically after drying to form an increasingly tough protective coating – rust inhibitive, acid and alkali resistant. Subox effectively safeguards metal surfaces: buildings, transformers, fences.

...Because Subox paint comes in modern, bright pastel shades, as well as darker colors, painting for normal maintenance can produce attractive decoration appropriate for neighborhood surroundings.

...Because Subox covers with a dense, impervious film, a single coat often is sufficient. Subox is both economical and good looking.

Write today for technical literature and color card.

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Subox Inc.

Established 1924

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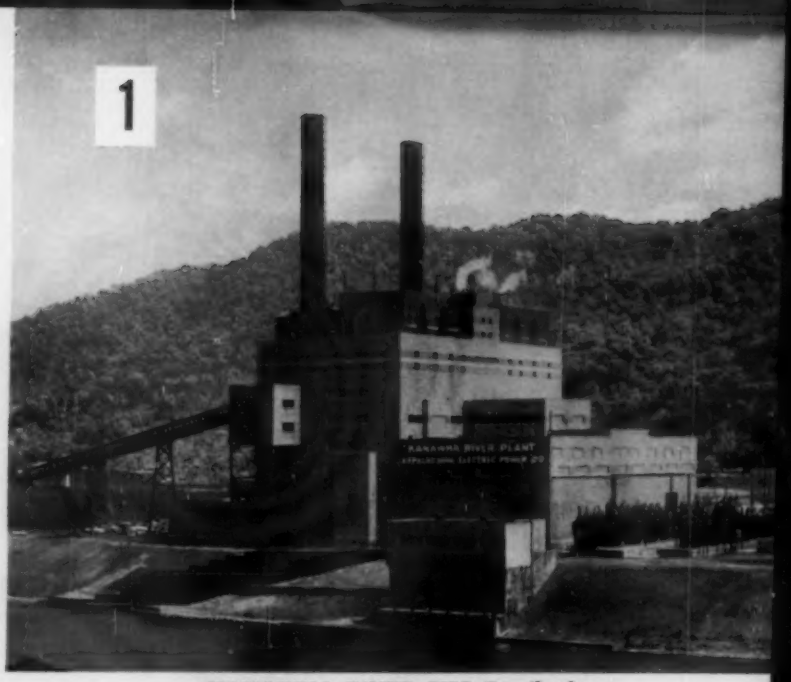
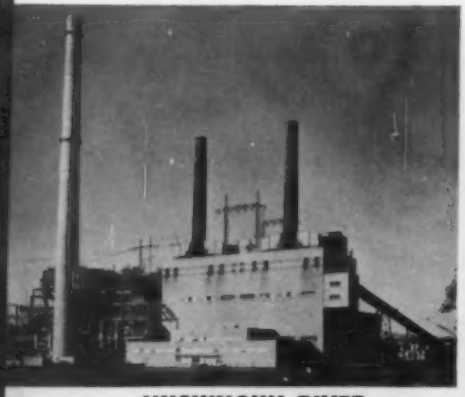


KANAWHA RIVER 9118 Btu/kwhr
Appalachian Power Co. on the American Electric Power System
Two B&W Pressure-Fired Radiant Boilers



MUSKINGUM RIVER
9139 Btu/kwhr Ohio Power Co.
on the American Electric Power System
Two B&W Pressure-Fired Open-Pass Boilers and one Pressure-Fired Radiant Boiler

RIVER ROUGE 9140 Btu/kwhr
Detroit Edison Co.
One B&W Radiant Boiler
Firing 10% Blast Furnace Gas and 90% Coa

CLIFTY CREEK 9147 Btu/kwhr
Indiana-Kentucky Electric Corporation*
Six B&W Pressure-Fired Open-Pass Boilers

TANNERS CREEK 9180 Btu/kwhr
Indiana & Michigan Electric Co.
Power System on the American Electric
Three B&W Pressure-Fired Radiant Boilers

KYGER CREEK 9201 Btu/kwhr
Ohio Valley Electric Corporation*
Five B&W Pressure-Fired Open-Pass Boilers

ST. CLAIR 9210 Btu/kwhr
Detroit Edison Co.
Four B&W Radiant Boilers

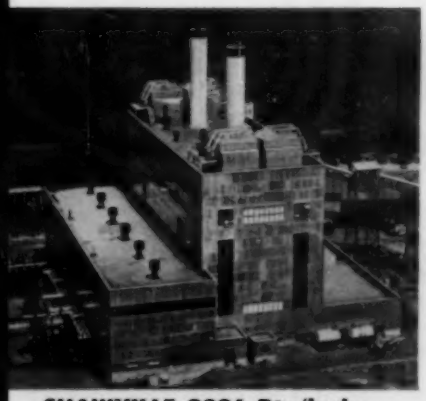
BAY SHORE 9210 Btu/kwhr
Toledo Edison Co.
One B&W Radiant Boiler

ALLEN 9349 Btu/kwhr
Duke Power Co.

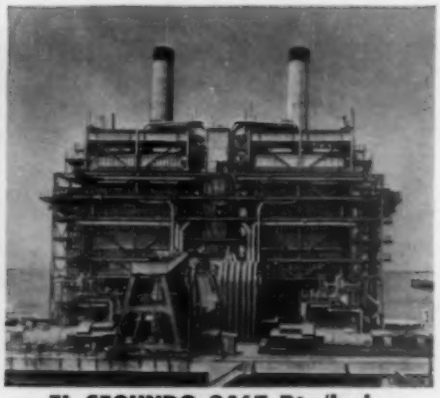
JOHN SEVIER 9350 Btu/kwhr
Tennessee Valley Authority

MILLIKEN 9371 Btu/kwhr
New York State Electric & Gas Corporation

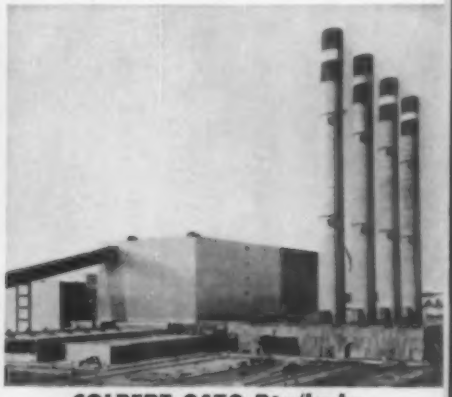
PHILIP SPORN 9370 Btu/kwhr
Appalachian Power Co. and Ohio Power Co.
on the American Electric Power System
Four B&W Pressure-Fired Radiant Boilers



SHAWVILLE 9396 Btu/kwhr
Pennsylvania Electric Co.
Two B&W Radiant Boilers



EL SEGUNDO 9467 Btu/kwhr
Southern California Edison Co.
One B&W Radiant Boiler



COLBERT 9470 Btu/kwhr
Tennessee Valley Authority
Four B&W Radiant Boilers

B&W Boilers Help Put 12 Power Plants Among Top 15 Most Efficient in Nation . . .

Outstanding proof that B&W engineering developments lead the way to reliable, economical power production

Of the 15 most efficient power plants in the United States as reported by the Federal Power Commission, 12 have B&W Boilers. Why? Because B&W's major investment in engineering research and development has led to great strides in power plant efficiency.

B&W is working with the Power Industry to keep electricity America's best bargain despite rising fuel and operating costs. Right now, B&W is investing millions of dollars in improved products—such as the Universal Pressure Boiler—in the better utilization of low grade fuels, basic metallurgical research for higher temperatures. In this way, B&W is helping America's utilities meet increased demands for abundant, economical electricity.

The Babcock & Wilcox Company, Boiler Division, Barberton, Ohio.

G-901-CS

*Ohio Valley Electric Corporation and its subsidiary, Indiana-Kentucky Electric Corporation, sponsored by these companies:

Appalachian Power Company[a] • The Cincinnati Gas & Electric Company Columbus and Southern Ohio Electric Company • The Dayton Power and Light Company • Indiana & Michigan Electric Company[a] • Kentucky Utilities Company • Louisville Gas and Electric Company • Monongahela Power Company[b] Ohio Edison Company • Ohio Power Company[a] • Pennsylvania Power Company[c] • The Potomac Edison Company[b] • Southern Indiana Gas and Electric Company • The Toledo Edison Company • West Penn Power Company[b]

[a]Subsidiary of American Electric Power Co. [b]Subsidiary of The West Penn Electric Co. [c]Subsidiary of Ohio Edison Co.

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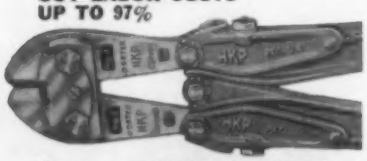

The famous PORTER CENTER-CUT CUTTER . . . our most popular tool . . . is the leading all-around cutter for industrial use! For Free Cutting of Soft and Medium Hard Metals up to ¾". Available in 6 sizes.

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Southern News Briefs (Continued)

21st Annual American Power Conf.

Nearly 90 papers will be presented at 27 technical sessions scheduled for the 21st annual American Power Conference to be held at the Hotel Sherman in Chicago March 31 through April 2.

Eight sessions will be devoted to the mechanical aspects of power generation and eight to electrical aspects, according to Conference Director, **R. A. Budenholzer,** professor of mechanical engineering at Illinois Institute of Technology, which is sponsoring the conference.

In addition, there will be two sessions on nuclear power, two on hydroelectric power, five on water technology, one on space heating, and one general session, Budenholzer said.

Three luncheons, and an All Engineers dinner on April 1, will complete the three-day program.

The session topics include central station steam generators, operating experience with once-through boilers, large steam turbines, central station power plants, nuclear power plants, peaking service, industrial power plants, hydroelectric power, and water technology.

Others are feedwater circuit, fuels, space heating, extra high voltage transmission, cables, circuit breakers, incremental loading, network analyzers, distributions systems and industrial power systems.

The speakers at the opening general session on March 31 will be **W. F. Rockwell, Jr.,** president, Rockwell Manufacturing Co., and **Murray Joslin,** vice president, Commonwealth Edison Co.

The luncheon speakers will include **J. W. Corette,** president, Edison Electric Institute, and **Dr. Earl L. Butz,** dean of agriculture, Purdue University.

Herbert D. Vogel, chairman of the board of the Tennessee Valley Authority, will address the All Engineers dinner.

The conference is conducted with the cooperation of a group of educational institutions and technical societies.

Air Assoc. — Dallas

Air Associates, Dallas branch, is now a full stocking distributor of **Republic Mfg. Co.'s** hydraulic valves for every industry, including globe, needle, selector, plug, check and relief valves. The Dallas branch is under the management of **J. L. Ericson.**

Hynes — Texas

A. Q. Roberts, Dallas, Texas has been appointed to represent the **Hynes Electric Heating Division,** Turbine Equipment Company, Mountainside, New Jersey. He will be responsible for sales and service of Hynes Electric resistance heating devices in the northeastern portion of Texas.

Prior to his recent appointment, Mr. Roberts spent eighteen years in contracting and sales of air conditioning equipment in Dallas.

Hynes Electric Heating Division produces resistance type heating elements for use in pipe lines, storage tanks, boilers and for ice melting and convection heating.

Ladish — Atlanta

George M. Perley has been appointed District Manager of Ladish Co. with headquarters at 1371 Peachtree St., N.E., Atlanta, Ga.

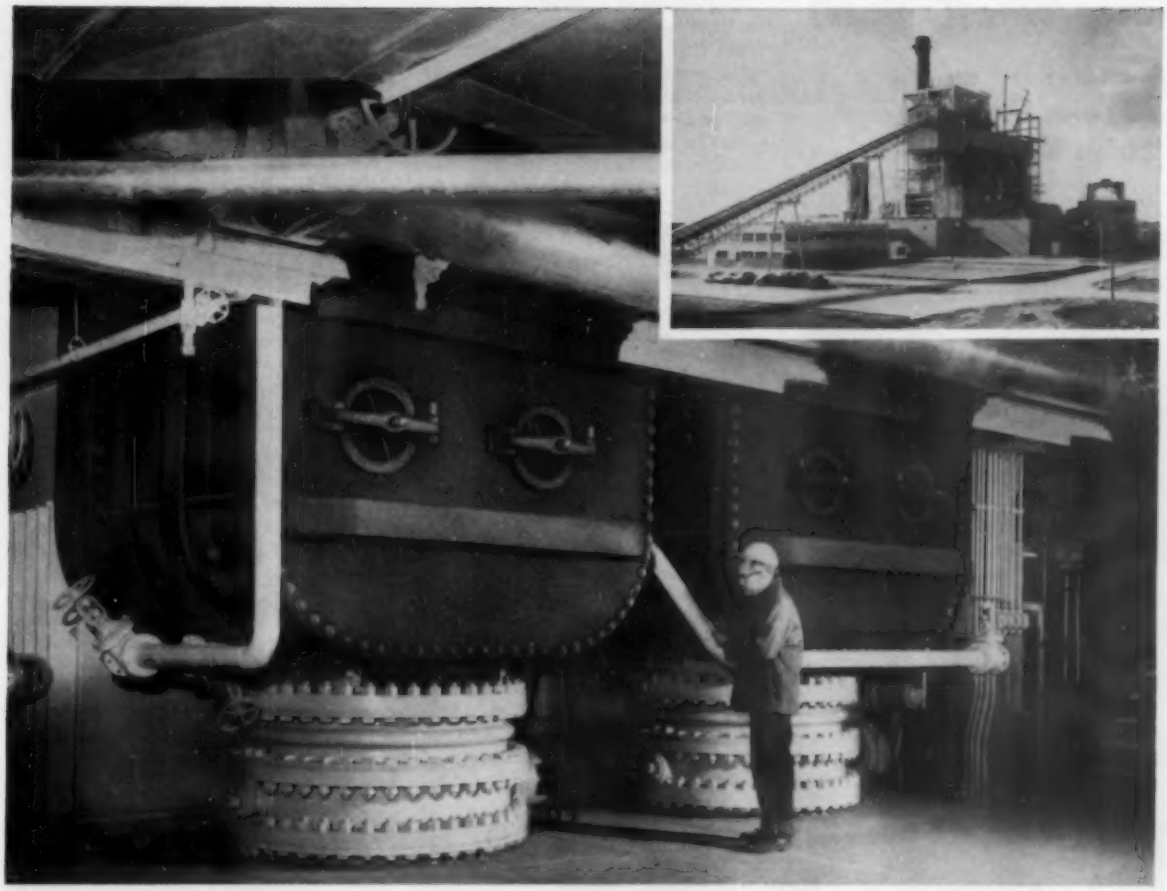
Mr. Perley is well-grounded in the fittings industry, having served at the company's main office and plant in the Atlanta area, and as Manager of the Baton Rouge, La. office.

Assisting him at the Atlanta address will be **Carroll T. Wallace.**

Riley Stoker

Riley Stoker Corp. has announced that **George C. Vail** is district manager and **Charles E. Meyer,** sales engineer at the company's Philadelphia office. District manager of the new district sales office at Charlotte, N. C. is **Robert C. Meleney,** former sales engineer at Philadelphia.

Mr. Vail was formerly district sales manager of Diamond Power Co.'s Philadelphia office, while Mr. Meyer headed Babcock & Wilcox Co.'s proposition engineering department at Philadelphia.



Consulting Engineers, Ebasco Services, Inc.

YUBA POWER EQUIPMENT MEETS GUARANTEES WITH FLYING COLORS

Based on the performance tests and favorable experience Kansas City Power & Light Company has enjoyed with Yuba power equipment in their Hawthorn Station, a Yuba 70,000 sq. ft. surface condenser and other important heat transfer equipment was specified and recently installed in their new Montrose Station near Clinton, Missouri.

Still another generating unit, planned for completion by this progressive company in mid-1960, will include basic heat transfer equipment supplied by Yuba.

In the operation of Yuba power plant equipment, one fact stands out: guarantees are unfailingly met, providing the economy, efficiency and safety demanded.

Actual performance checks in plant after plant show that performance conditions exceed design specifications. For example, heat transfer coefficient is greater, terminal temperature differential is lower, and oxygen content in the condensate much less than guaranteed.

Your comparison will rate Yuba first too. Let us give you all the facts, today.

Write for new Yuba Bulletin No. YHT 100, just off the press. This bulletin describes Yuba Heat Transfer Equipment manufactured for the power industry. Your free copy will be sent without delay.

Power Equipment Engineered and Manufactured by

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YUBA CONSOLIDATED INDUSTRIES, INC.

YUBA

Plants and Sales Offices NATIONWIDE

News Briefs (Continued)

Hudson-Rush Expand Sthwstrn. Operations

With sales offices in Shreveport, Dallas and Amarillo, the **Hudson-Rush Company** is now offering expanded facilities and service to Southwestern process industries.

R. Mack Goble, engineering graduate of the University of Texas, has joined the Shreveport office to assist **Morley Hudson,** president, with sales and application engineering. Mr. Goble was formerly with the Industrial Division, Minneapolis-Honeywell Regulator Company in El Paso and Shreveport.

Hudson-Rush now has their own office building at 819 Kings Highway, Shreveport, Louisiana.

Wally Hopkins, also an engineering graduate of the University of Texas, is now associated with Jack Rush, vice president in the Dallas office at 210 Casa Linda Plaza. Mr. Hopkins has had extensive experience with boilers, burners, and combustion controls with a leading Southwestern firm.

Hudson-Rush Company specializes in heat transfer equipment ranging from Erie City boilers, Brown Fintube extended surface heat transfer equipment to Pritchard cooling towers and Western heat exchangers.

In the area of final control devices, the firm represents Anderson, Greenwood relief valves, Conoflow actuators and control valves, Rockwell butterfly valves and Amot thermostats, temperature controls and engine safety controls.

AAF — Dallas

The Ray Company, 4411 Belmont Avenue, Dallas, Texas, has acquired a sales agreement with **American Air Filter Co., Inc.,** Louisville, Ky., to market AAF's line of air filter products. This line formerly was represented by Gilbert Engineering Co., also of Dallas.

The Ray Company is now a sales outlet for all products manufactured by the American Air, Herman Nelson, Kennard, and Illinois Engineering Divisions of American Air Filter Company.

Tank Linings by Avondale Marine Ways

Avondale Marine Ways, Inc., one of the nation's largest marine construction and repair firms and a leading Southern steel fabricator, has been named a franchised applicator of U. S. Permobond tank linings by **United States Rubber Co.**

Avondale, which operates several plants in the New Orleans area, will be the rubber company's outlet in Louisiana, Alabama, Arkansas and Mississippi as well as the western parts of Tennessee and Florida.

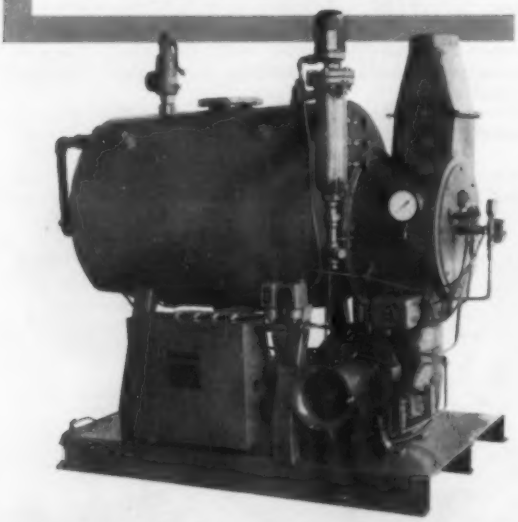
In addition to its marine construction and repair facilities, which were started 20 years ago, the New Orleans company also fabricates many other heavy steel products, reconditions oil drilling equipment and operates a porcelain enamel plant.

U. S. Rubber's tank linings will be used in a variety of ways, especially in the construction of equipment for the chemical processing and allied industries. Such construction will be carried on principally at the Avondale, La., plant of the company, located on the Mississippi River.

A lot of power in a little package

TXT

VAPORMATIC COIL-N-SHELL STEAM GENERATOR



The Coil-N-Shell packs a lot of horsepower and steam generating capacity into a small space. It requires only a fraction of the space required by conventional boilers with rated steam outlet pressures from 5 to 150 psig . . . with a horsepower range from 35 to 300.

The Vapormatic Coil-N-Shell is an ideal steam generator for processing, cleaning, heating and other applications. It is completely automatic and all sizes have modulating controls as standard equipment. They are available with gas, oil and combination gas-oil fuel burning systems.

The Coil-N-Shell is a forced circulation, water tube type steam generator, employing an advanced method of steam generation. All component parts are integrally mounted on a common base, requiring only feedwater, fuel, steam and electrical connections to put it in service. It generates steam from a cold start in ten minutes and is ready for high temperature operation immediately.

For the utmost in simple, convenient, economical steam generation in the smallest space, specify the TXT Vapormatic Coil-N-Shell. Complete specifications, design and operating data, as well as rated capacities and performance features are contained in bulletin No. 582 CSA. Write for your copy now.

TXT TEXSTEAM Corporation

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You can control hot water temperatures automatically–economically

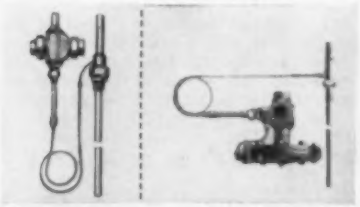
By John W. Ritter, Test Engineer
SARCO Company, Inc.

A dependable supply of hot water at exactly the right temperature for employee comfort is just as important a task for the plant engineer as providing properly heated water for process requirements. Fortunately, accurate, reliable regulation of water temperature is easy to achieve *economically* through the use of properly selected temperature controls.

It's impossible to maintain constant supervision of the delivered temperature of hot water with manual controls. Accommodating fluctuating loads that vary all the way from zero to peak requires automatic temperature regulation, controls that stay on the job all day long.

What to look for:

Automatic regulators are not difficult to select if you bear in mind the degree of control you require. You need reliability within a fairly constant predetermined temperature range – anything more than the *simplest mechanism to do this job is a waste of money.*

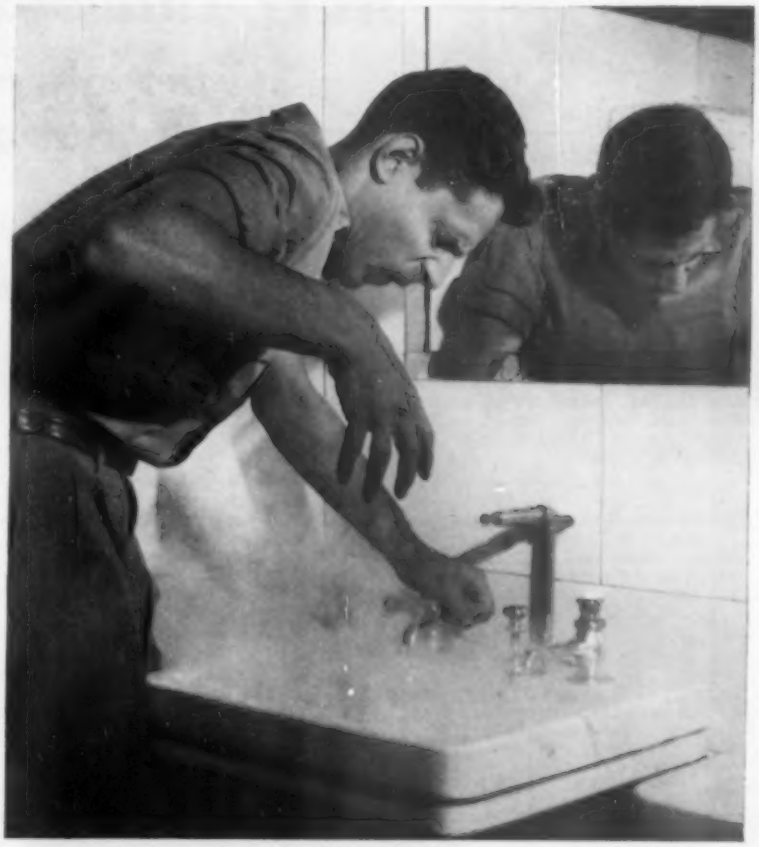


Sarco Type 50-21 Self-Powered Temperature Regulator

Sarco Type 24-30 Self-Powered Pilot Operated Temperature Regulator

First cost is important, naturally; but it is also well to examine very carefully the cost of installing or maintaining a temperature regulator. A pipe fitter should be able to do the job. When all these criteria are applied to regulator selection, the logical choice narrows to a self-operated type like the Sarco 24-30 pilot-operated model or the fully-modulating 50-21. Both of these regulators operate by powerful self-contained hydraulic systems that provide smooth operation with even increments over their full temperature range.

Both Sarco self-operated types give you automatic temperature control without high cost. The result: hot water constantly supplied at the required temperature regardless of fluctuations in supply or demand.



End erratic hot water temperature... with SARCO Self-Powered Controllers

You'll find Sarco Self-Powered Temperature Controllers regulating water temperature in scores of industries. And because these Sarco Temperature Regulators require no electricity, compressed air, or any external power supply, because they're the simplest automatic controls made, they can be kept in first-class working order by the regular maintenance staff – without special training. There are no glands or stuffing boxes, nothing to get out of order. And Sarco Regulators are inexpensive to buy, easy to install.

Write today for Bulletin 620, on Sarco self-powered temperature regulators.

6929-B

SARCO
COMPANY, INC.
635 Madison Avenue, New York 22, N. Y.

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NEW Catalogs & Bulletins

. . . there is always a BETTER WAY

MAINTENANCE—TOOLS EQUIPMENT & METHODS

10 — Hard Surfacing — 20 page digest TIS 2821 discusses wear and need for overlays for abrasion, corrosion, friction, heat and impact; case studies; check list of 15 characteristics overlay deposits should exhibit. — EUTECTIC WELDING ALLOYS CORP.

19—Sealing Compound—Data sheet describes Tite Seal for leakproof, pressure-tight connections. Gasket and joint compound heat and vibration proof. Prevents rust and corrosion. — RADIATOR SPECIALTY CO.

29—Belting Repairs — Two bulletins "How to Properly Join Belts" and "Belt Fastener Selection Chart" offer service help on conveyor, elevator and transmission belting. — CRESCENT BELT FASTENER CO.

31 — Stack Maintenance — How wrought iron offers unique defense against flue gas corrosion described in bulletin "Wrought Iron for Flue Gas Conductors."—A. M. BYERS COMPANY.

45—Correct Lubrication — "Lubriplate Data Book" shows importance of providing and maintaining proper and economical maintenance of all types of plant machinery thru adequate lubrication. — FISKE BROTHERS REFINING CO.

58—Tube Expander Drives — Bulletin 581 gives data on complete line of Torq-Air-Matic automatic tube expander drives and explains the importance of precision control in tube expanding. Chart to aid selecting right model for the right job. — THOMAS C. WILSON, INC.

64 — Anti-Corrosive Paints — Bulletin "The Application of Subox and Subalox Paints" — Gives the story of a complete paint system for weather, moisture and alkali protection, with details as to application.—SUBOX, INC.

FANS—PUMPS—COMPRESSORS HEATERS—HEAT EXCHANGERS

108—Active Air—Catalog 2046 shows how to put active air to work in buildings and shops. Direct drive exhaust fans, air circulators, and ceiling fans. — EMERSON-ELECTRIC.

111—Heat Exchangers — Bulletin 2.2K1 describes and illustrates BCP Exchangers for land or marine service. Pre-engineered, fully standardized, all-copper and copper alloy construction, removable tube bundle, outside packed floating head. — ROSS HEAT EXCHANGER DIV.

116—Air & Gas Compressors—Form 3132-A shows complete range of centrifugal and reciprocating units in process and chemical industries — for all pressures from deep vacuum up to 35,000 psi and capacities up to 165,000 cfm. — INGERSOLL-RAND COMPANY.

142—Centrifugal Pumps — Full line of single stage horizontally split case centrifugal pumps described in 16 page Bulletin 721.6; capacities 200-6400 gpm; heads up to 425 ft; maximum standardization and interchangeability of parts.—GOULDS PUMPS, INC.

143—Chemical Feeders — 36 p Bul. 1136 describes metering pumps — types, construction, displacement and operating pressures. Gives handling recommendations for chemicals, acids, etc., and volumetric conversion tables. — MANZEL.

169—Airfoil Fans — Bulletin covers complete line of Airfoil mechanical draft fans for forced and induced draft featuring wide range of pressure-volume ratios, high efficiency, low noise level, rugged construction. —GREEN FUEL ECONOMIZER CO.

172—Pressure Fans — For 10" to 50" SP and capacities 200 to 13,000 cfm. Dimensions and capacity tables included in 20 p Catalog 857. — CLARAGE FAN CO.

INSTRUMENTS—METERS CONTROLS—REGULATORS

200—Control Centers — Built to specific needs of the job to prevent costly breakdowns later. Units custom-built from best components. Specializing in quick deliveries. — THOMAS B. COMBS COMPANY.

201—Valves & Gages—Handy guide No. 36 gives data & prices on valves, liquid-level gages & accessories for process and power industries. — PENBERTHY MFG. CO.

205 — Draft Gages — Bulletins describe inclined, vertical tube, air filter gages, straight line and dial pointer type, minified draft and receiver type gages, velocity gages and pitot tubes, gas analyzers and steam calorimeters. — ELLISON DRAFT GAGE CO.

212—Automatic Temperature Control —Data sheets describe versatile automatic indicating temperature control offering many sequence combinations—step-heating, heating and cooling, wide limit control, or temperature control plus operation of signal devices.—SARCO COMPANY, INC.

221—Boiler Water Level Controls—Catalog describes exclusive magnetic operating principle. Low water cut-offs (single stage); pump controls; low and high water alarms; and water columns. Complete line 0-900 lb wsp. — MAGNETROL INC.

231—Control Valves — Catalog No. 305 illustrates and describes construction and specifications for a wide line of air operated diaphragm control valves suitable for the majority of general process applications and plant services. — MASON-NEILAN.

238 — Auxiliary Alarm on Remote Gages — Bulletin C6 — Eye-Hye Remote Reading Gage with electrode and relay adaptation actuates auxiliary audible or visible signals at high or low water levels. — RELIANCE GAUGE COLUMN CO.

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244—Desuperheaters — 4 p Bulletin 1024-A describes steam-assist desuperheating. Charts show the close control of temperature which is possible during wide load fluctuations. Schematic diagrams of piping arrangement and control systems. — COPES-VULCAN DIV.

267—Remote Liquid Level Indicator —How clear, brilliant readings from any angle are possible with this unit is explained in Bulletin WG-1824. Pointer is always visible, even at extreme high and low water levels. Of manometric type with automatic temperature compensation. — YARNALL-WARING COMPANY.

268—Water Reducing Valve — Bulletin 553 describes how 50% greater capacity regulation is gained with Hi-Flo water pressure valve. Includes complete sizing data. — LESLIE CO.

299—Boiler Control Systems—GPS-901 describes power, steel, marine and industrial boiler control systems and components. Also temperature and process control systems. Water treatment chemicals, boiler compounds and inhibitors for industrial and municipal purposes. — HAGAN CHEMICALS & CONTROLS, INC.

PLANT CONSTRUCTION—WELDING EQUIPMENT—SPECIALTIES

300—Fact Folders — 23 up-to-date industrial fact-file folders on aluminum, steel, copper, stainless steel, insulation, roofing and other industrial supplies immediately available from 9 Southern warehouses. — REYNOLDS ALUMINUM SUPPLY CO.

301—Vacuum Cleaning Systems — How portable and stationary systems cut costs and increase plant efficiency shown in Booklets P8 and AB-100. Eight heavy duty units (1½ to 15 hp) for cleaning hard to get at areas, reclaiming valuable materials, etc. — U. S. HOFFMAN MACH. CORP.

303—Stacks & Breechings — Form 75 describes monolithic linings for full protection of stacks and breechings, utilizing castable refractories. Typical installations illustrated and described. — PLIBRICO CO.

305 — Industrial Heating — Catalog 50, 50 pages — Gives data on the type and size of electric heating units and similar equipment for industrial heating needs. Detailed diagrams and photographs describe applications.—EDWIN L. WIEGAND CO.

307—Condensate Drainage Control— Publication 6025 describes units for improving quality of heat transfer in process equipment through continuous return of condensate to boiler at high temperature and pressure. Lists many cases substantiating claim for increased heat transfer, more production with less fuel. — COCHRANE CORPORATION.

323—Mercury Vapor Fixture — Industrial color corrected units described in Bulletin 401. "Stabilux Socket" secures bulb end of lamp, eliminating lamp rupture and breakage from vibration. — WIDE-LITE CORP.

335—Classifying Systems — Bulletin explains general operating characteristics of centrifugal and gravitational type classifiers. Curves illustrate high efficiencies achieved in actual installations and indicate particle size distribution of incoming feed, separated fines and coarse material. — BUELL ENGINEERING CO., INC.

342—Power Roof Ventilators — Bulletin 550 describes V-belt driven centrifugal type power roof ventilators. Pressures to 2" SP; capacities from 1500 to 26,500 cfm.—CLARAGE FAN CO.

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351 — Grating & Treads — Bulletin 2527 describes electroforged riveted, rectangular, diagonal, "U" and "T" types of interlocked grating and treads. Safe load tables and specification information. — BLAW-KNOX EQUIPMENT DIV.

355—Steam-Jet Cleaners — Bulletins JC-100 and SG-200 describe steam - jet cleaners. Series "R" Speedylectric generates steam to 250 psig and temperatures to 405 F. Larger cleaners available. — PANTEX MFG. CORP.

363—Magnetic Separators — Catalog 910 covers wet concentration and magnetic recovery. Various types and sizes shown as well as typical installations and machines. — JEFFREY MFG. CO.

377—Track Switch Materials — Catalog 575A points out time and money savings through single-source buying of track materials and supplies. Offers information on frogs, switches, crossings, etc. — L. B. FOSTER CO.

386—Rigid Frame Buildings—8 page bulletin "Dixisteel Rigid Frame Buildings" — low cost, flexibility of design, durability, and minimum maintenance; also triangular or bow-string truss all-steel roof systems; fabricated for rapid erection. — ATLANTIC STEEL COMPANY.

392—Cutters — Bulletin 718 illustrates and describes company's line of cutters and industrial tools. Also includes index to help in selecting the right tool for the job. — H. K. PORTER, INC.

PIPING—VALVES—FITTINGS STEAM SPECIALTIES—TRAPS

409—Lubricated Plug Valves—Catalog PV-4 covers operational features. Quarter-turn to open or close; lubricant grooves provide positive seal when valve is closed; when open, seating surfaces not exposed. —THE WM. POWELL COMPANY.

411 — Steam Trap Book — 44 page Steam Trap Book contains useful data on trap sizing, calculation of condensate loads, installation and maintenance data. — ARMSTRONG MACHINE WORKS.

421—Air or Gas Venting Traps — 4 p Bulletin 450 describes complete line of cast iron and forged steel ball float traps for venting any gas from any liquid under pressures from 5 lb to 1500 lb. Includes selection data, installation drawings and ordering information. — ARMSTRONG MACHINE WORKS.

432—Aluminum Jacketing — Data sheets describe low first-cost, long life jacketing for weatherproofing of insulated lines, towers, vessels and tanks. Lap-Seal design feature makes more positive weather seal. — CHILDERS MANUFACTURING COMPANY.

438—Steam Traps — 8 p Bulletin T-1742(57) illustrates and describes high capacity impulse steam traps. Includes capacities, dimensions, weights, and prices.—YARNALL-WARING CO.

452—Pipe and Tubes—42 page Bulletin 26 gives types of steel tubes, tensile, creep and rupture properties, welding and forming data, applications and other valuable data.—National Tube Div., UNITED STATES STEEL CORP.

456—High Alloy Castings & Pipe—Bulletin 3354G explains how static and centrifugal casting & pipe offer maximum resistance to heat and corrosion. — THE DURALOY COMPANY.

463—Stainless Steel Valves — Catalog 59 SS describes complete

Bulletins (Cont.)

line of gate, globe and swing check valves with full details of valve patterns in alloys that satisfy requirements of most corrosive services. Includes section to show degree of resistance of alloys to many corrosive media under varying conditions. — JENKINS BROS.

487—Plastic Valves — 6 p Circular illustrates new Luncor valves and fittings. All-moulded corrosion-resistant PVCC valves made to handle wide range of acids and alkalis and to resist chemical attack and deterioration. — THE LUNKENHEIMER CO.

BOILERS—STOKERS TURBINES—BURNERS

508—Steam-Turbine Units—Medium condensing turbines utilizing either non-reheat or reheat; non-condensing turbines; single, double and triple automatic extraction turbines; admission units; and admission-extraction steam turbines for utilities and process industries described in Bulletin GEA-3277D. — GENERAL ELECTRIC.

511—Feedwater Treatment — Bulletin describes liquid and dry (Braxon & Flako) boiler feedwater treatment recommended for removal and prevention of scaling and corrosion during use of many types of water and for prevention of foaming and carryover. — ANDERSON CHEMICAL CO.

514—Generator Installations — Bulletin GB-1 shows how installations of Amesteam Generators have solved boiler room problems for their owners. Photos illustrate units from 10 through 600 hp for firing combinations of oils and gases. — AMES IRON WORKS, INC.

519—Feed Water Deoxygenation—12 page Bulletin BW-7 describes advantages of chemical deoxygenation of boiler feed water with an aqueous solution of Hydrazine. Covers in detail the properties and action of Hydrazine in maintaining boilers as well as recommended methods of application. — FAIRMOUNT CHEMICAL CO., INC.

530—Coal Plant Specifications — 64 page brochure, including 5 drawings, is a comprehensive guide for preparing specifications on coal-fired, low-pressure heating plants in the size range of 750,000 to 5,500,000 Btu/hr. All aspects affected by choice of fuels from storage bin to stack design covered fully. — BITUMINOUS COAL INSTITUTE.

543—Soot Blowing Systems — 4 p Bulletin 1015A describes Pneu-Blast system for installations where steam available is at too low a pressure, or where air compressor capacity is less than would be required with other methods of air blowing. Diagrams explain how pressure indexing controls system according to compressor capacity. — COPES-VULCAN DIV.

551—Packaged Water Tube Boilers — Complete data and dimensions for boilers ranging from 8,000 to 50,000 lb/hr, firing oil or gas or both, described in 12 p Catalog 111-D. — SUPERIOR COMBUSTION INDUSTRIES, INC.

552—Pulverizer — Low power consumption and less maintenance with planetary roll and table mill for pulverizing solid fuels to commercial fineness. Bulletin MB58-1 gives details. — FOSTER WHEELER CORP.

570—Seamless Boiler Tubes — 44 page Bulletin 12 contains complete description of manufacture, advantages, tolerances, allowable stress and working pressures, bursting strength, weights, steam properties and other data. — National Tube Div., UNITED STATES STEEL CORP.

USE SPI READER SERVICE

See Pages 73-74

574—Packaged Generator—Bulletin 582 describes Vapormatic Coil-N-Shell Steam Generator for service requirements of 5 to 150 psig. Gives operation features and specification data. Available with gas, oil, and combination gas/oil fuel systems. — TEXSTEAM CORP.

578—Packaged Firing Units — Bulletin 28 illustrates and describes the Series 20 Steam Atomizing Packaged Firing Units for oil and/or gas fuels. Includes specifications and dimensions. — NATIONAL AIROIL BURNER CO., INC.

ENGINES—DRIVES POWER TRANSMISSION MATERIALS HANDLING

602—Pneumatic Ash Conveyors — Bulletin S57-A describes pneumatic ash conveyors for rugged, wear-resistant pipe and fittings that provide lower maintenance cost per ton of ash covered. — NATIONAL CONVEYORS CO. INC.

610—Flexible Couplings — All metal couplings described in Catalog 51A have no wearing parts; offer freedom from backlash, torsional rigidity; free end float; smooth continuous drive; and visual inspection in operation. — THOMAS FLEXIBLE COUPLING CO.

619—Automatic Coal Scales — Bulletin O352A covers Model H-39 (capacities up to 40 tons/hr) automatic coal scales. Coal never arches in feeder or weighing hopper — dust sealed; contact platework of stainless steel. — RICHARDSON SCALE COMPANY.

630—Mechanical Vibrating Conveyors — Catalog 890 gives information on conveyability and density of typical solid materials and provides data on how to "Do It Yourself" to get required length. — JEFFREY MFG. CO.

631—Screw Conveyors—Catalog ID-541, 68 pages — Illustrates and describes standard and special types of conveyors, with engineering data necessary for selection. Tables give sizes, types, speeds, horsepowers and other information. Accessories included. — CONTINENTAL GIN COMPANY.

639—Diesel Engines — 16 p Catalog BU-413 describes two new diesel engines — Models D-344 and D-516. Includes photographs, cutaways, charts and other illustrations. — ALLIS-CHALMERS MFG. CO.

649—Fork Lift Trucks — 16 p Catalog BU-451, "Be Years Ahead With Fork Lift Trucks" covers the FT series of lift trucks. Includes engineering, design, construction and operating story of units. — ALLIS-CHALMERS MFG. CO.

WATER TREATMENT—HEATING & AIR CONDITIONING—DUST & FUME CONTROL—REFRIGERATION

702—Water Conditioning — Bulletin 611C, 20 p, describes manual & automatic softeners, zeolites and ion exchange resins, mixed-bed and multi-column deionizers, dealkalizers, ion exchange systems, filters & purifiers, and water treating chemicals. — ELGIN SOFTENER CORPORATION.

704 — Water Conditioning — Brochure describes company's engineering services — zeolite water softeners, filters and purifiers, modernized and rebuilt water softeners, aerators and degasitors and process and boiler water conditioning. — SOUTHERN WATER CONDITIONING, INC.

711—Refrigeration Condensers—Bulletin RC-2 shows how Vogt condensers step up rate of heat transfer

and step down head pressures. Closed type for clean waters; film type where water is hard and forms scale. Units save power and refrigeration cost.—HENRY VOGT MACHINE COMPANY.

712 — Ion Exchange Equipment — Bulletin A-255 describes the various methods of ion exchange treatment which provide suitable boiler feedwater, process water, and purified solutions.—ILLINOIS WATER TREATMENT CO.

718—Zeolite Softeners — 20 p catalog 4520 describes the sodium zeolite softening process in detail. Contains data required for proposals, lists factors important in selection of proper zeolite material and in sizing of equipment. Single valve controls all cycles of service and regeneration. — COCHRANE CORPORATION.

720—Power Roof Ventilator — 4 p Bulletin 550 illustrates and describes company's Centrilator, the centrifugal power roof ventilator with the exclusive "jet siphon." Includes capacity and dimension tables. — CLARAGE FAN CO.

729—Refrigerant Condenser—Bulletin 131 shows benefit of panel construction in condensers with capacities from 100 to 240 tons refrigeration. Illustrations, diagrams and photos explain functions of aero-evaporative condensers with Duo-pass precooling coil and oil remover. — NIAGARA BLOWER CO.

734 — Dust Collector — 8 p bulletin describes dust collection system for collecting nearly 5 tons of dust per hour. Includes 1st and 2nd stage collectors — 48 cyclones and 2 twin-section electric precipitators. Well illustrated. — BUELL ENGINEERING CO., INC.

750—Industrial Water—"Your Most Important Raw Material" describes consulting services on procurement, treatment and disposal of industrial water, including design of treatment and disposal plants. Emphasis on power, steel and industrial boiler water conditioning. — HALL LABORATORIES.

768—Steam Humidifiers — 16 page Bulletin No. 500 shows necessity of humidification, lists recommended storage and processing temperatures and relative humidities, lists regain of hygroscopic materials and complete physical details of all types of Armstrong steam humidifiers. — ARMSTRONG MACHINE WORKS.

774—Refrigerating Units — Bulletin 97-F illustrates and describes low-pressure refrigerating units. — FRICK CO.

ELECTRICAL

811—Electric Heat — "100 Ways to Apply Electric Heat" gives a wealth of informative data on the use of electric heat in industry — fast, uniform, dependable, backed by nation-wide engineering service. — EDWIN L. WIEGAND CO.

812—Open-Type Motors — Bulletin 05-51B9040 describes "Super-Seal" open-type motors which are unaffected by moisture, dust, dirt, oils, acids and alkalies. Motors have a 1.15 service factor which frequently permits using a smaller motor size. — ALLIS-CHALMERS MANUFACTURING CO.

839—Power Transformers — 8 p Booklet B-7299 "Preventive Maintenance of Power Transformers Through Modernization" includes component replacement descriptions, adaptations and methods of oil preservation.—WESTINGHOUSE.

860 — Capacitors — Correct power factor at the load. Bulletin PF-1150 describes self-contained capacitors in sizes from ¼ to 15 kvar. No additional switches or fuses required. — SPRAGUE ELECTRIC COMPANY.

861 — Electrical Protection System — Bulletin HCS — Describes "Fusetron" dual-element fuses which save recalibration and maintenance costs, eliminates down-periods caused by needless blows and saves on installation costs. Available in all sizes from 1/10 to 600 amperes, both 250 and 600 volt types. Also in plug types for 125 volt circuits.—BUSSMANN MANUFACTURING COMPANY.

869—Heaters & Devices — 72 page Bulletin BEC-1005H includes information on redesigned cartridge heaters, miniature soldering irons, aluminized steel sheath strip heaters, and new ratings and configurations of finned tubular heaters. Describes ceramic-to-metal and plastic resin hermetic seals. Also contains power requirements section. — GENERAL ELECTRIC CO.

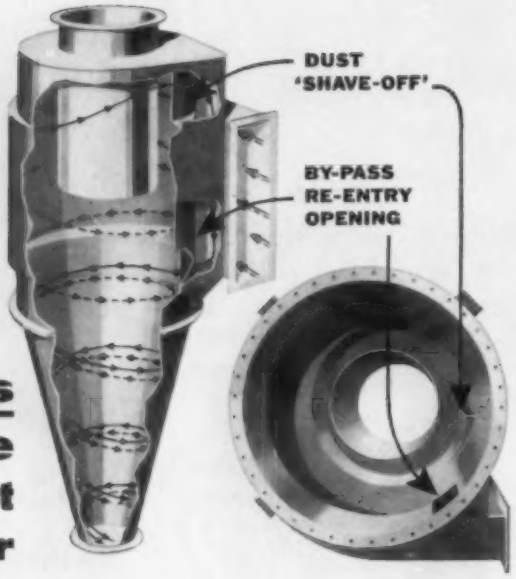
879—Commutator Maintenance — 27 page booklet B-6150-A contains information on brush and commutator maintenance. Includes maintenance requirements, factors affecting commutation and carbon brush materials. — WESTINGHOUSE ELECTRIC CORP.

884—Portable Cords — Bulletin covers complete new line — Securityflex cords for severest applications; Industrial "all-purpose" cords for hard usage; and Service cords for shop appliances. — ANACONDA WIRE & CABLE COMPANY.

Lubriplate No. 630-2 is a high temperature, extreme pressure, water-repellent, grease type lubricant. Ideal for the general lubrication of Industrial, Automotive, Construction, Farm and Marine Equipment. Lubriplate Grease Gun Cartridges provide an easy, quick, economical means of application. Prevent the waste and mess of hand filling. Packed 10 Cartridges in a handy carrying carton.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Write for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. LUBRIPLATE DIVISION, Fiske Brothers Refining Company, Newark 5, N. J. or Toledo 5, Ohio.



This Cyclone won't clog or plug

Buell's exclusive 'Shave-off' design permits large diameter cyclones that will not clog, plug, or bridge when properly operated: you avoid unnecessary maintenance work or process interruptions.

The unique Shave-off port traps the dust that whirls upward in double-eddy currents, increases cyclone efficiency by eliminating this source of dust reentrainment. Whether installed singly or in groups, Buell Cyclones are the most efficient ever developed.

Other features include extra heavy plate construction for longer service life, Buell-designed manifolds for more efficient, non-turbulent flow of dust-laden gases . . . and the confidence assured by a history of hundreds of installations everywhere in America. Write for a copy of the 12-page booklet, "The Exclusive Buell Cyclone": Dept. 80-B, Buell Engineering Company, Inc., 123 William St., New York 38.

Large-diameter Buell Cyclones in series with Buell 'SF' Electric Precipitator.

buell®

Experts at delivering Extra Efficiency in

DUST COLLECTION SYSTEMS

News Briefs (Cont.)

AAF — Houston

A. B. "Tony" Ullrich, Jr., Houston, Texas, has been named new Southern Regional Manager for **American Air Filter Co., Inc.** He succeeds Morris G. Munson, St. Petersburg, Fla., who has retired. Munson will work with Ullrich for the remainder of the year.

Ullrich is a graduate of Texas Tech ('34, BS-EE) and has more than ten years' association with AAF in sales capacities.

AAF's Southern Regional Office is now located at 4101 San Jacinto Street, P. O. Box 8188, Houston 4, Texas.

Joseph T. Ryerson — Dallas & Houston

Joseph T. Ryerson & Son, Inc., nation-wide steel distributing subsidiary of Inland Steel Company, has acquired the Dallas and Houston plants and stocks of **Vinson Steel and Aluminum Company,** steel and aluminum distributor in that area. The transaction, announced jointly by Joseph L. Block, president of Inland and chairman of Ryerson, and Charles L. Hardy, Ryerson president, was accomplished by an exchange of stock of undisclosed amount.

Bailie W. Vinson, chairman of the Vinson company will devote his full time to the Vinson Supply Company, an oil country goods and industrial supplier which he founded in 1922, with warehouses at Tulsa, Okla., Houston, Dallas, Odessa, Amarillo and Farmington, Texas.

Ryerson is the largest steel distributor in the United States, operating 18 steel service centers in major industrial areas from coast to coast. Addition of the Vinson properties brings the total to 20.

The comprehensive stocks carried at Dallas and Houston include hot rolled and cold finished carbon steel bars, sheets, plates, structural shapes and tubing, also alloy steel, stainless steel, and Reynolds aluminum in sheets, coils, shapes and bars.

Fred W. Bush, Vinson president and general manager at Dallas and **Ralph A. Castillo,** branch manager at Houston, will remain at their respective positions.

Screened facade of Stuart Co. plant, Pasadena, California

Iron Fireman-Kewanee boiler-burner unit

Lounge and offices overlook spacious atrium

Architect: Edward D. Stone

Mechanical Engineers: Stockly & Bamford

Mechanical Contractors: Hickman Bros., Inc.

Where the *steam* comes from...

for both heating and pharmaceutical processing

One of the notable commercial buildings of the year combines maximum utility with such striking beauty that it has won nation-wide acclaim. Designed by Edward D. Stone, this plant is used by the Stuart Co. for the production of pharmaceuticals.

Up-to-the-minute mechanical equipment includes two Iron Fireman-Kewanee boiler-burner units. Due to forced draft firing, there is no stack to mar the symmetry of the building. Dual-fuel burners efficiently fire gas or any grade of light or heavy oil, with quick changeover.

Complete Iron Fireman boiler-burner units can be easily sized, specified and ordered from a single catalog, with a single model number.

Conservative rating permits an easy, economical "cruising speed" at rated output, with 50% reserve capacity and consequent minimum noise level and low maintenance costs.

Mail coupon for detailed information and specifications.

IRON FIREMAN®

AUTOMATIC FIRING EQUIPMENT FOR HEATING, PROCESSING, POWER

IRON FIREMAN MANUFACTURING CO.
3135 West 106th Street, Cleveland 11, Ohio
(In Canada, 80 Ward Street, Toronto, Ontario)

Please send catalog and specifications on following equipment:

- ☐ Complete boiler-burner units
- ☐ Forced draft firing unit only

Name.....

Firm.....

Address.....

City.....State.....

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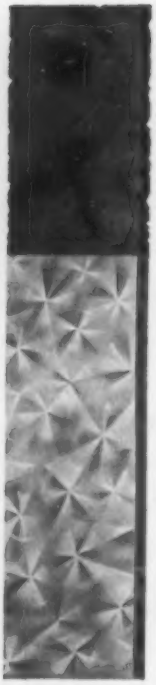


HOT-DIP GALVANIZING by DIXISTEEL

TRADE MARK

adds years of life to Iron or Steel

Nothing protects iron and steel from rust better than zinc. And nothing applies zinc better than hot-dip galvanizing.

Our modern equipment assures small, tight spangles . . . smooth, uniformly heavy coats of zinc . . . no burrs or fins! A tough, long-lasting barrier against rust and corrosion.

Call, write or wire for prices and information.

ONE OF THE SOUTH'S LARGEST HOT-DIP GALVANIZING TANKS

Accommodates pieces up to 45' long by double-dipping

OFFICIAL • INSIGNIA • HOT-DIP GALVANIZING

Atlantic Steel Company

P.O. Box 1714 • ATLANTA 1, GEORGIA • TRinity 5-3441

News Briefs (Cont.)

Solar — South

Four sales firms have been named as new representatives for **Solar Aircraft Company's** industrial bellows and expansion joints.

They are Control Equipment Company, Inc., Atlanta, Ga.; The T. J. O'Brien Engineering Company, Memphis, Tenn.; H. M. Summerell Company, Richmond, Va.; and O'Brien Equipment Company, St. Louis, Mo.

Control Equipment Company, Inc., located at 3240 Peachtree Road, N. E., Atlanta, Ga., will handle the sale of Solar's industrial products in Alabama, eastern Tennessee and Georgia. The area includes two counties in western South Carolina and excludes the Atlantic coast counties of Georgia.

The T. J. O'Brien Engineering Company of 668 S. Main Street, Memphis, Tenn., will cover the portion of Tennessee west of the Tennessee River and northern Mississippi.

H. M. Summerell Company, Suite 105 Seaboard Building, Richmond, Va., has been assigned to the State of Virginia.

O'Brien Equipment Company, located at 2832 Olive Street, St. Louis, Mo., will handle the sale of Solar's industrial bellows and expansion joints in eastern Missouri, southern Illinois, and a portion of western Kentucky.

Industrial expansion joints are used in large quantities by the petroleum and chemical industries, public utility power plants, atomic energy installations and other industries. They are used in applications where temperature, pressure, expansion, axial and angular movement and vibration present difficult piping problems.

Acme Industries

Bob Carow, owner of Bob Carow Co. of Lubbock, Tex., has been appointed sales engineer in the Texas Panhandle territory for **Acme Industries, Inc.** of Jackson, Mich.

Charles M. Colyer of Greenville, S. C. has been appointed the new sales engineer in South Carolina for the company, which manufactures air conditioning systems and refrigeration equipment for commercial and industrial process cooling.

If steam costs give you

THAT FRUSTRATED FEELING . . .

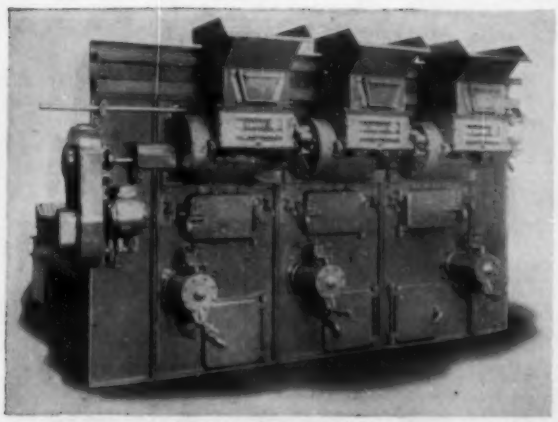
GET RID OF IT!

Modern DETROIT STOKERS under your present boilers will give you more steam at lower cost

If you can't get a new boiler plant you can still handle more load and reduce steam costs.

Many plants have done it by putting Detroit Stokers under existing boilers—to take advantage of improved combustion efficiency and higher burning rates. Savings and increased steaming capacities are substantial . . . are particularly worth while considering the moderate investment involved.

Let us show you the records of some of these plants. Investigation does not obligate you.



Detroit RotoStoker

One of the Detroit Stokers which will save you money. The line includes the LoStoker, UniStoker, Single Retort Stoker, Double Retort Stoker in the underfeed types . . . RotoStoker, RotoStoker Type CC (continuous cleaning) and RotoGrate Stoker (continuous ash discharge) in the spreader types.

There is a type and size of Detroit Stoker for any industrial or power need—3000 to 400,000 pounds steam per hour boiler capacity.

Detroit Stokers are available to burn all ranks of bituminous coals and lignites . . . and many waste and refuse fuels.

Our 60 years experience can be invaluable to you in selecting a type and size to meet your requirements.

Write for Bulletin.

Detroit Stokers cost less. Cost = initial investment + upkeep + production losses due to equipment outage. The total is less with Detroit.

COAL YOUR MOST ECONOMICAL FUEL

Most industrial plants are in areas where coal is the least expensive fuel. With Detroit Stokers it is by far the most economical.

DETROIT STOKER COMPANY

MAIN OFFICE AND WORKS • MONROE, MICHIGAN

District Offices or Representatives in Principal Cities

For more information, use Reply Card—Page 73

KALAMAZOO

...worth more to you

MODEL 8CW

If you are interested in cutting costs and increasing production—maintaining extreme accuracy with the latest designed horizontal metal cutting band saw machine — write for complete details or contact your local Kalamazoo distributor.

MACHINE TOOL DIVISION

Kalamazoo TANK and SILO COMPANY

News Briefs (Cont.)

Cutler-Hammer

Expanded sales coverage in the South and greater service to customers has been provided in a recent broadening of Cutler-Hammer field marketing organization.

F. A. Wright, general sales manager, has announced that the 22 sales districts have been divided into Eastern, Central, Southern, Midwestern and Western regions.

The Southern region includes Atlanta, Dallas, Kansas City and St. Louis districts. **E. A. Clark** is regional sales manager and has been succeeded as Dallas district manager by **W. J. Phillips.**

J. P. Simon is regional sales manager of the Eastern region including the Baltimore, Boston, Newark, New York and Philadelphia districts. He has been succeeded as Philadelphia district manager by **S. S. Blackmore.**

Warren Pumps — SW

Warren Pumps, Inc., Warren, Massachusetts, has appointed **Allan Edwards, Inc.,** 2445 South Jackson Street, Tulsa, Oklahoma, their Industrial Sales Representative for Oklahoma, Kansas, and parts of Nebraska, Iowa, Texas, Missouri, and Arkansas.

Allan Edwards, Inc., also has offices in Dallas, Texas at 4924 Greenville Avenue, and in Kansas City, Missouri at 1519 Cherry Street.

Warren manufactures a complete line of centrifugal, reciprocating, screw, and gear pumps for industry.

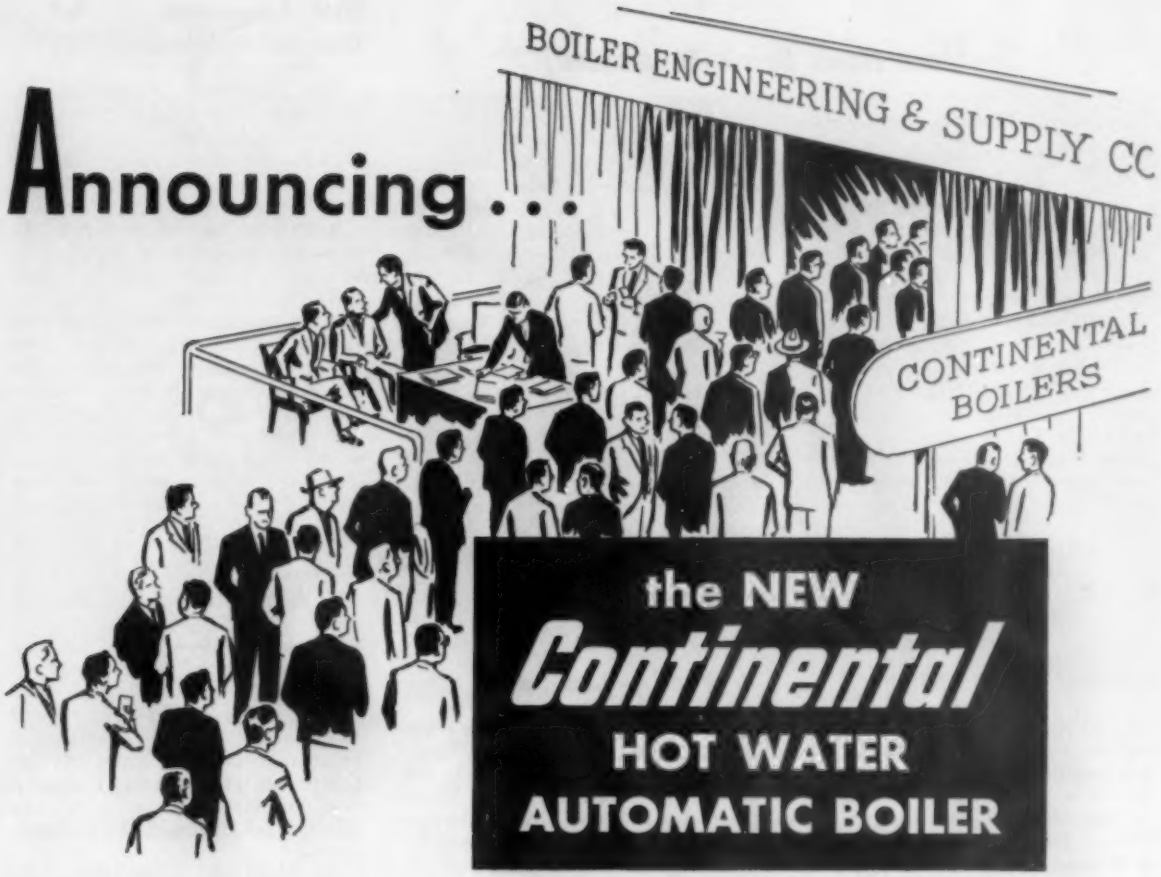
Clark Bros. — Sthw.

Clark Bros. Co., Division of Dresser Industries, has announced the appointment of **William Dumar** and **Joseph A. Goodnough** as Sales Engineers in the Mid-Continent area served by the Tulsa, Oklahoma Office.

Mr. Dumar joined the Clark organization in 1950, and has held posts in the Service, Parts, and Engine Sales Departments.

Mr. Goodnough joined Clark Bros. in 1955. Prior to his new appointment, he was an application engineer for Clark Turbo Products.

Announcing . . .



the NEW *Continental* HOT WATER AUTOMATIC BOILER

Shown for the first time at the ASHAE Show in Philadelphia January 26-29

Here is a completely new approach to Hot Water Boiler design. Continental gives you all the features you want for efficiency . . . for economy . . . for low maintenance costs. Check these performance advantages:

- In the history of package boilers, there has never been a single case of damage due to "thermal shock" with the Continental Boiler.
- Operates at high or low water differential temperatures . . . at high or low rates of water circulation . . . responds rapidly to temperature controls.
- May be used for either direct or reverse flow.
- Has internal expansion space to cushion the dynamic surge of circulators and eliminate entrapped air from system water.

For complete engineering data on the new Continental Hot Water Automatic Boiler, see the Continental representative or write for Bulletin BE-200.

BOILER ENGINEERING & SUPPLY CO., INC.
Phoenixville, Pa.

Southern News Briefs (Continued)

Combustion Acquires Gen. Nuclear Engr.

Combustion Engineering, Inc., has filed a registration statement with the Securities and Exchange Commission relating to the acquisition of **General Nuclear Engineering Corporation** through an exchange of stock.

General Nuclear is engaged in rendering design, engineering, advisory, research and development services in the field of nuclear energy and is presently associated with several important nuclear power projects. It will be operated as a subsidiary.

Dr. Walter Zinn, president of General Nuclear, will be in charge of all of Combustion's nuclear power activities. Dr. Zinn is one of the foremost scientists in the nuclear field and a pioneer in the designing and building of nuclear reactors. Under the late Dr. Enrico Fermi, he supervised the construction of the world's first nuclear reactor at Stagg Field, Chicago, early in World War II. From 1946 to 1956 he was director of the Atomic Energy Commission's Argonne National Laboratory.

Combustion has been active in the nuclear field for more than twelve years and has extensive facilities for the design, development, manufacture and testing of reactor systems, including both light and heavy components. Work now in process at these facilities includes fuel element fabrication, core assembly and manufacture of a variety of heavy components.

Cooling Tower Inst.

Ennis C. Smith of Hudson Engineering Corporation, Houston, Tex., has been elected secretary, filling the vacancy created by resignation of The Marley Company from the Cooling Tower Institute; and **James P. Wiseman** of Fluor Products Company, Whittier, California, has been elected treasurer. **Karl E. Johnson** of J. F. Pritchard & Co. of California continues as president and **Ernest E. Goitein** of Foster Wheeler Corp., as vice president of the national association of the major manufacturers of industrial water-cooling towers. Palo Alto, California, headquarters and field research programs continue under direction of Executive Manager **Raymond C. Kelly.** New field service department offices under management of Field Engineer **James L. Willa** have been established at 1120 West 43rd Street, Houston, Texas.

B&W Nuclear Div. Headed by Currie

Dr. Lauchlin M. Currie has been elected a vice president of **The Babcock & Wilcox Company** and placed in charge of the Atomic Energy division.

To accept the new B&W post, Dr. Currie retired as a vice president of Union Carbide Nuclear Company, a division of Union Carbide Corporation.

Bermico — Southeast

Frederick J. Bex of Atlanta, Georgia, has been named southeastern Sales Representative of the **Bermico Division of Brown Company,** one of the nation's largest producers of fibre pipe and electrical conduit with mills in Berlin, N. H. and Corvallis, Oregon.

Bex will handle sales of Bermico electrical conduit, fibre pipe for sewers and sewage disposal fields, for land and highway drainage, irrigation, and for natural gas ventilation throughout the Southeastern area of the United States. His headquarters will be in Atlanta.

Bex has been associated with Solvay Process Co., Syracuse, Campbell Soup Co., Inc., Camden, N. J., and for the past seven years, was Southeastern Regional Product Sales Manager with Carrier Corporation in the Southeastern region.

Parker-Hannifin

Appointment of **Kentucky Mine Supply Co.,** Harlan, Kentucky, as a distributor for Parker synthetic rubber o-rings for sealing applications has been announced by Tommy J. McCuistion, sales manager of Parker Seal Company, division of Parker-Hannifin Corporation.

Technical assistance as necessary will be provided by **W. E. Swan,** Parker Seal Company representative covering the Cincinnati territory.

Olin Aluminum Distrib. — Stheast

The Warehouse Division of **Atlantic Steel Company,** Atlanta, Ga., has been appointed a distributor for Olin Aluminum, the trade name for aluminum produced by Olin Mathieson.

Established in 1947 to supply the increasing needs of the South's rapidly growing metal-working industry, Atlantic Steel's Warehouse Division distributes non-ferrous and ferrous metals to customers from North Carolina to Mississippi. Atlantic's Warehouse Division has two modern service centers: North Side Drive and 14th Street, Atlanta; and 5230 First Avenue, South, Birmingham, Ala. Both have a total floor space of 114,000 sq ft.

Orr & Sembower — Okla.

Orr & Sembower, Inc., Reading, Pa., manufacturers of Powermaster packaged automatic boilers, O&S Fuel Burning Systems and other heat exchange and combustion equipment has announced the appointment of **Bagwell Company,** 1740 East 6th St., Tulsa, as its sales and service representative in Oklahoma.

The Bagwell Company offers complete application engineering services and is well experienced in industrial, commercial and institutional applications of boiler and burner equipment to process and comfort heating.

BS&B — Md.

A. L. Hacker Company, Inc., 308 Wyndhurst Avenue, Baltimore 10, Maryland, has been appointed manufacturer's representative for **Black, Sivalls & Bryson** controls, safety heads and tank vents in the Baltimore-Washington area, according to Charles R. Bootz, General Manager of the Controls Division, BS&B.

J. E. Sirrine — S. C.

R. R. Adams has been elected Chairman of the Board by **J. E. Sirrine Co.** of Greenville, S. C., replacing **Allen S. Bedell** who has recently retired.

George Wrigley, Jr. succeeds Mr. Adams in the position of President.

How Copes-Vulcan control systems boost power plant efficiency

Copes-Vulcan puts combustion control at operator's finger tips

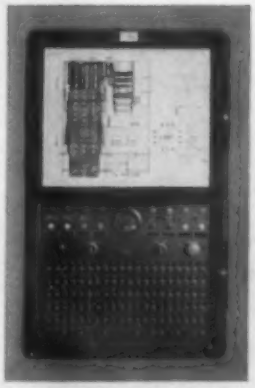
Equipped with easy-to-read recorders and control stations, this compact Copes-Vulcan panel centralizes operator control and simplifies boiler operation. This modern system features circuit simplicity with independent control loops on air flow, fuel loading and furnace draft. Drive units assure accurate positioning and fast response, and eliminate the need for interconnecting control loops.

A custom installation . . . a continuing service

Copes-Vulcan Combustion Control is just part of an integrated boiler control system for regulating feed water, boiler steam temperature and boiler cleaning.

Whether furnished in individual units or integrated into a single system, each installation is tailored to meet specific requirements of generating capacity, load range and fuel. Copes-Vulcan supplies skilled service, when needed, for the life of the installation.

Write for Bulletin 1032 showing a Copes-Vulcan control system working at a showcase generating plant.



Precision boiler cleaning with Copes-Vulcan Selective-Sequence or Automatic-Sequential soot blowing systems. Space-saving panel permits easy monitoring, flexible programing . . . assures thorough cleaning with less steam and/or air. Write for Bulletin 1029.

Desuperheater improves temperature control. New Variable-Orifice Desuperheater* holds reduced steam temperature constant only 20' downstream from desuperheater outlet, even over a 50-to-1 load range. Write for Bulletin 1037. *Patent applied for

Copes-Vulcan Division
BLAW-KNOX COMPANY
Erie 4, Pennsylvania

NEW Product Briefs

. . . there is always a BETTER WAY

Hard Facing Spray

C-1 A new spray-powder material, developed by **Metallizing Engineering Co., Inc.,** 1101 Prospect Ave., Westbury, Long Island, N. Y., for use with the Metco ThermoSpray Gun, permits hard facing with sprayed tungsten carbide at very high deposit efficiency — better than 90% and extremely high concentration of the carbide. Coating speeds are also high — 110 to 150 sq ft/hr, .001" thick. Any required coating thickness may be applied.

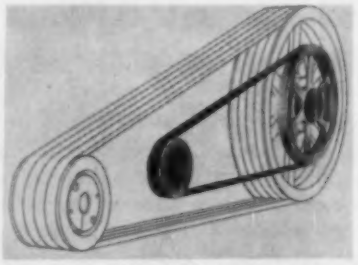
Coatings are torch-fused after spraying and the close control of

coating thickness permitted, plus the comparatively smooth surface produced, minimize finishing operations. This is a very important cost factor when working with a material like tungsten which approaches the diamond in hardness.

V-Belt Saves Space & Weight

C-2 The new Super HC V-Belt Drive by **The Gates Rubber Company,** 999 South Broadway, Denver 17, Colorado, with narrower, deeper cross-sectioned, high-capacity belts and new narrower sheaves, offers up to three times the horsepower capacity in the same space.

The new drive permits four reductions — in the width of belts and sheaves; in the diameters of sheaves; in center distances; and in the overall cost of drives. The savings that can be effected are estimated to run as much as 20%.



The new V-belt provides complete coverage of the entire range of drive requirements with only three cross-sections instead of the five formerly necessary. High-performance materials provide such additional horsepower capacity that cross-section dimensions could be made nearly 50% smaller.

The arched top of the new belt prevents distortion of the tensile section, permitting each of the tensile cords to carry its proper part of the load. Improved concave sidewalls eliminate concentrated wear on the sides of the belt, and insure precision fit in the groove for maximum pulling power.

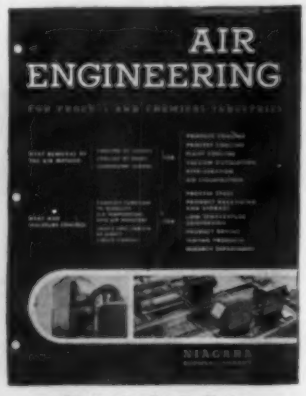
Photo illustrates the new V-belt drive in contrast with presently used V-belt drive in comparable application.

For More Free Data FILL IN CODE NO. on the Handy Return Card — Page 73

AIR ENGINEERING by NIAGARA

- AIR CONDITIONING with precise regulation of air temperature and air moisture for processing, for product drying, packing, storing, low temperature conversion, for testing and research.
- "NO FROST" REFRIGERATION for food and low temperature conversion, for testing and operations at extreme low temperatures; for moisture control below the freezing point of water.
- AFTER COOLING and air drying for large air and gas compressors and AIR LIQUEFACTION.
- COOLING ENGINES, COMPRESSORS, HYDRAULIC PRESSES.
- COOLING QUENCH BATHS, FURNACES, INERT ATMOSPHERES.
- COOLING ROLLS, WELDERS, DRAWING OR EXTRUSION DIES.
- PRODUCT AND PROCESS COOLING CHEMICALS OR INTERMEDIATES.
- COOLING LIQUIDS OR GASES IN CLOSED SYSTEMS.
- VAPOR CONDENSING UNDER VACUUM.
- REFRIGERANT CONDENSING.
- ELECTRONIC PROCESS COOLING.

You will reduce your costs, solve your problems of water supply or disposal and get HIGH OPERATIONAL EFFICIENCY with Niagara "Aero" Evaporative Heat Exchangers, After Coolers, Condensers, Air Conditioners or Coolers for these important plant services or processes.



Write for this Bulletin No. 135

High operational efficiency means: precise temperature for improved product and process quality control, heat removal at rate of input, simple operating conditions, real economy in upkeep, sustained full capacity. It means the lowest expense for up-keep.

Write for Bulletin 135

NIAGARA BLOWER COMPANY

Dept. SP-2, 405 Lexington Ave., New York 17, N. Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

for complete... sure... permanent... low cost

UNDERGROUND HOT PIPE PROTECTION

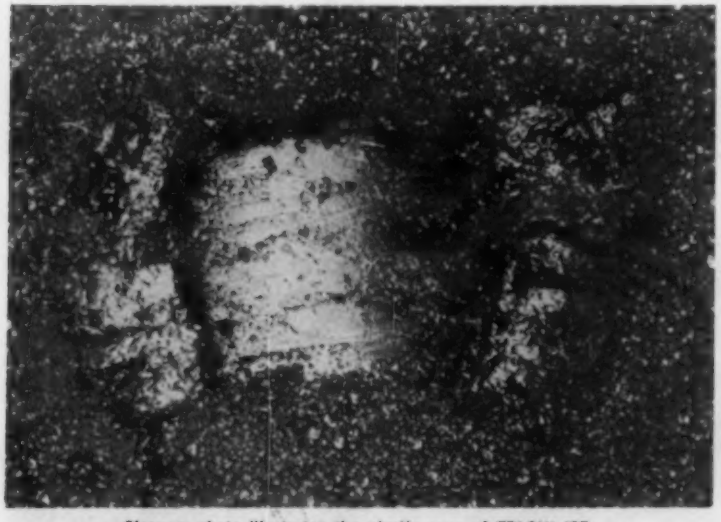
Specify and Use.....

TRI-SUL-ITE

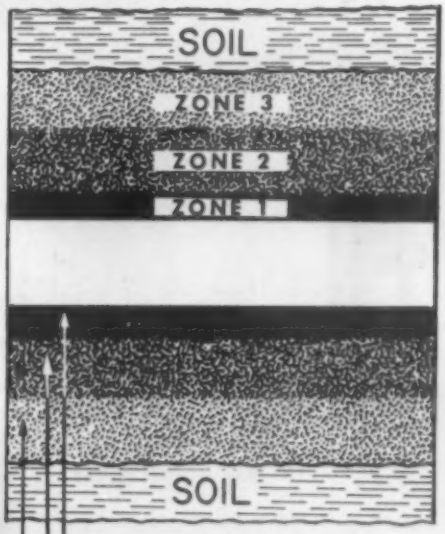
3-WAY PROTECTION SYSTEM*

THE ZIEGLER GILSONITE MINERAL

Looking for an underground piping system that's free from excessive heat loss... yet gives the greatest protection possible from corrosive soil conditions? A system with a low installation cost and minimum maintenance expense? Then TRI-SUL-ITE 3-way protection system is your answer. TRI-SUL-ITE installations have proven to be the speediest... easiest... surest underground pipe protection. TRI-SUL-ITE, a specially selected gilsonite, is poured under and around all pipes in the trench. After proper curing, it forms three zones of protection against water, corrosion and heat loss.



Close-up photo illustrates the plastic zone of TRI-SUL-ITE peeled back to show excellent adhesion for pipe protection.



***ZONE 1 PROTECTION: PERMANENT WATER BARRIER**

The first zone of TRI-SUL-ITE adjacent to the pipe, fuses from pipe heat into an impermeable, waterproof coating. It resists normal soil acids and alkalis. When it is plastic the pipe movement is contained within this zone. The first zone of TRI-SUL-ITE protection gives positive assurance that water cannot follow the grade of the pipe.

***ZONE 2 PROTECTION: EXCELLENT INSULATOR**

The second zone consists of the edges of the TRI-SUL-ITE granules fused to isolate the air spaces, resulting in a highly effective insulator which minimizes heat losses to the soil.

***ZONE 3 PROTECTION: INSULATOR AND WATER BARRIER**

The third zone of TRI-SUL-ITE granules is not fused by heat and provides maxium insulating efficiency plus good resistance to water penetration and protection against surface shocks and subsoil stresses.

Write for complete literature.

ZCO

G. S. ZIEGLER & COMPANY

GREAT NECK, N. Y.

Agents in Principal Cities Throughout the United States and Canada.

MINES: "CASTLE PEAK," "LITTLE BONANZA," "LITTLE EMMA"

NEW!
PENBERTHY ILLUMINATORS
for Liquid Level Gages

58 WATT 3000 HOUR BULB

accurate readings

overall illumination
no glare
no blind spots

Faster, more accurate liquid level readings are provided by Penberthy's new, improved, explosion-proof, dust-tight illuminators. 58 Watt Bulb (with medium screw base) gives higher light intensity for 4-times the life of ordinary illuminators. Exclusive rugged aluminum housing over bulb extends bulb life, offers better protection and simplifies relamping. Clear plastic wedge diffuses light over entire length of gage glass.

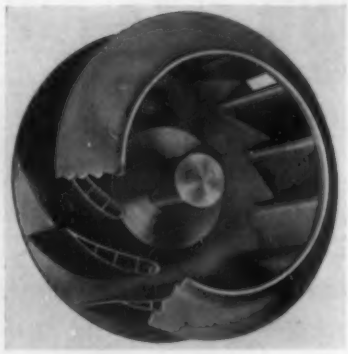
Illuminators are easily installed on present or new gages. Available in single or double sections, they are used in combination for gages with 3 or more sections. Approved by Underwriters' Laboratories for Class 1, Group C and D hazardous locations.

For further information on Penberthy Illuminators, liquid level gages and valves, write or phone. Ask for Catalog #36.

PENBERTHY

PENBERTHY MANUFACTURING CO.
Division of Buffalo-Eclipse Corporation
1242 Holden Ave., Detroit 2, Michigan

New Product Briefs (Continued)

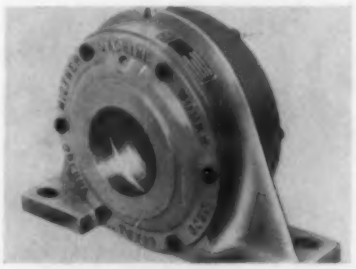


Centrifugal Blowers

C-3 A new line of centrifugal blowers having a wide range of pressures and volumes has been announced by **Joy Manufacturing Company,** Oliver Bldg., Pittsburgh 22, Pa. Sizes vary from 440 cfm at ¼" static pressure for a single-width, single-inlet fan to more than 460,000 cfm at 16" static pressure for a double-width, double-inlet fan.

Called Joy-Centrifoil Fans these new blowers are an improved design over backward curved fans. The new blades have an airfoil shape, giving greater efficiency, silent operation and reduced horsepower.

The new Centrifoil Fans meet all the requirements for commercial and industrial heating and ventilating applications as well as those of a forced or induced draft nature.

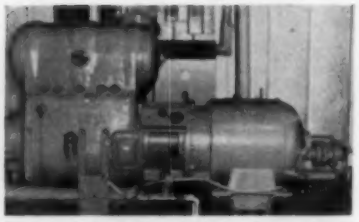


Pillow Blocks

C-4 A new line of pillow blocks, accommodating all series of spherical roller bearings, is being manufactured by **Miether Machine Works,** Box 3907, Odessa, Tex. Through interchangeable end caps, twenty basic housings in this line will accommodate 94 separate bearings. Some housings take as many as eight different bearing sizes and up to 11 separate shaft diameters.

To install a different bearing size, it is necessary only to fit new end caps on the housing. End caps and housings are jig drilled for perfect interchangeability.

Housings are center-grooved for universal center lubrication (W-20 and W-33 specifications), and end caps have a second connection for side lubrication. Either labyrinth closures or oil seals are available on most caps.



Rotary Air Compressors

C-5 An improved line of industrial rotary air compressors, featuring new "Perma-Vane" rotor blades, has been announced by **Davey Compressor Co.,** Kent, Ohio.

Made of special solid, lightweight material, these Perma-Vane blades are reputed to have substantially greater wear resistance than those used in most rotary machines. Their lightweight and minimum friction reduce the amount of horsepower required by the compressor and make possible important operating economies.

The new line includes compressors with displacements of 8 to 650 cfm. Units are available in 2 to 125 hp sizes. Built for continuous use, compressors may be operated at pressures up to 125 psig.

In operation the new rotary units have 50% fewer working parts than others of the same capacity. Units are designed to deliver air at 100° above ambient temperature.

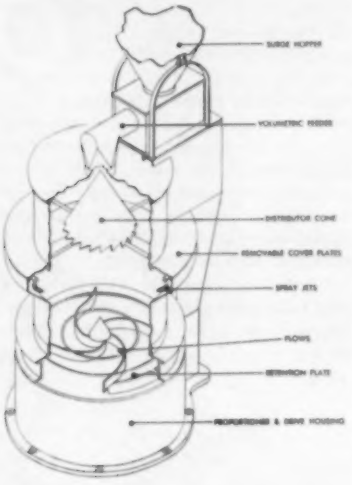
All Davey Hydrovane Compressors are completely enclosed. There are no exposed belts or couplings. Water-cooling is not necessary, but is available at the option of the user.

For More Free Data FILL IN CODE NO. on the Handy Return Card — Page 73

Continuous Blender

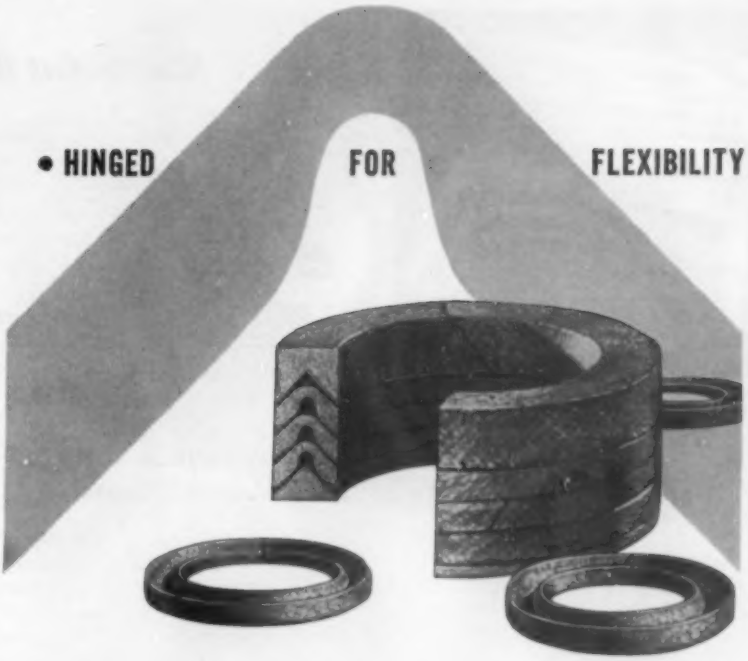
C-6 A new, continuous-flow blender has been developed by **The Johnson-March Corporation**, 1724 Chestnut St., Philadelphia 3, Pa. that accurately proportions, mixes, blends and discharges a wide range of dry materials, or blends liquids with solids in precise quantities.

Materials to be treated or blended are fed proportionately into the Verticone Blender via controlled volumetric feeding equipment onto the apex of a cone, causing the material to form a circular, falling curtain as it leaves the base periphery of the cone.



At the base of the cone, spray headers can be provided to disperse any desired liquid into the mixture in any proportions required. Liquid is sprayed on the blended dry material from both inside and outside the curtain as it falls onto a retention plate. Further blending of both the solids and liquids is made on the retention plate by mixing blades that automatically discharge the completely blended and treated material.

In applications where only solids are blended, effective and economical dust control can be provided by conditioning with Compound MR solution. This is an extremely powerful surface active compound developed by Johnson-March, to keep the fine particles evenly dispersed to prevent segregation in the mix and eliminate dust. Controlled wetting in the Verticone is achieved with as little as a fraction of one per cent of moisture, or it may be precisely adjusted and metered to add any specific volume of moisture desired.



BELL-SHAPED V-Design makes BEL-VEE PACKING *pressure sealing*

Scientifically designed to make the pressure seal itself, Bel-Vee Rings expand toward the rod and stuffing box wall, with increased pressure, to automatically form the seal. Then when pressure is relaxed, Bel-Vee Rings contract from the rod for free movement with minimum friction.

That is why Bel-Vee Ring Packing keeps equipment running smoothly—cuts maintenance—lasts longer.

Offered in sets for pressures to 6000 psi for sealing reciprocating rods of pumps, engines, compressors, hydraulic equipment and valve stems.

Bel-Vee Rings are individually molded in practically every rod and stuffing box size, and in a number of basic material combinations for use against water, oil, solvents, steam, air and gas. Catalog No. 56. Also available in du Pont Teflon for all-chemical service. Catalog T-57.

ask your BELMONT Distributor

Such leading Packing Distributors as:

Warren & Bailey in Los Angeles

and

Speck-Marshall in Pittsburg

are ready to supply your emergency as well as regular requirements.

The Belmont Packing and Rubber Company

Butler & Sepviva Streets, Phila. 37, Pa.

BELMONT

Whirlex Forced Draft heavy duty fans are designed for service in all types of boiler and industrial applications. Special design airfoil impellers provide maximum static efficiency. All-welded housing construction allows for a dust-proof, leak-proof operation.

Whirlex Induced Draft heavy duty fans are available with either straight or evase type self supporting stacks. Special shaft cooling sleeves allow for the efficient use of air cooled bearings. Water cooled bearings can be furnished if desired.

Write for complete information on these and other types of Whirlex industrial fans.

Fly Ash Arrestor Corp.
201 N. 1st Street
BIRMINGHAM, ALA.

WHIRLEX

New Product Briefs (Continued)

	BELTS		SHEAVES			CENTER DISTANCE	HP	WEIGHT (LBS.)	COST	
	Number	Size	O.D. Driver	O.D. Driven	Width				Per hp	Per Drive
CONVENTIONAL TAPER-LOCK DRIVE	3	A425	4.15"	8.95"	2½"	12.3"	4.62	24.7	$5.91	$27.38
DYNA-V TAPER-LOCK DRIVE	2	3V400	3.35"	8.00"	1⅛"	10.8"	5.0	18.0	$4.50	$22.50
% SAVING *Savings vary with different sized drives*			19%	10%	56%	12%	+	27%	23.8%	17.8%

Comparison of conventional Taper-Lock Drive and the new Dyna-V Taper-Lock Drive — 3 hp, 1750 rpm, 2.41 to 1 ratio.

V-Drives Reduce Size, Weight & Costs

C-7 A completely new line of V-belt drives, featuring smaller and lighter sheaves and V-belts of higher capacity at substantially lower cost, has been announced by **Dodge Manufacturing Corporation,** Mishawaka, Indiana.

With the new Dyna-V line, the majority of industrial drives can be handled with belts only ⅜-in. wide, and sheaves that are greatly reduced in both width and outside diameter.

Dyna-V drives are being offered in two standard groove sizes to meet all except the largest industrial requirements. Besides the ⅜-in. (nominal top width) size, known as 3V, the company is manufacturing a 5V, or ⅝-in. size for higher horsepowers. Sheaves in the 3V series, from one to 10 grooves, are designed for drives ranging from one to 50 hp. The 5V series will include sheaves to take from three to 10 of the ⅝-in. belts, and will handle drives up to 200 hp.

There is also an 8V series of made-to-order Dyna-V sheaves and one-inch belts, for even higher horsepower requirements, ranging up to 1500.

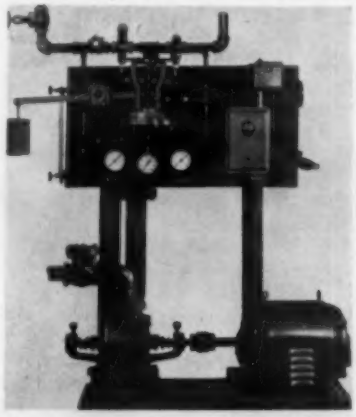
Boiler Return System

C-8 A differential drainage and boiler return system offered by **Stickle Steam Specialties Co.,** 2215 Valley Ave., Indianapolis 18, Ind., is designed for plants wherever steam is used for processing at pressures over 30 pounds.

New features include a 2-stage pump, new floatless liquid level control, chrome plated pump internals, and teflon packing in differential valve.

The system is said to return condensate from steam processing units to the boiler at 300 degrees or higher — only 15 to 20 degrees less than the temperature at operating pressure. This lowers fuel costs 10% to 25% over the usual open system. Raw make-up water needs are reduced up to 90%, thereby minimizing corrosion and boiler strain.

A differential valve automatically maintains any desired differential in pressure between steam in the boiler and pressure in the system's receiver tank. Since the system requires only 25 lb pressure differential, power required for pumping is reduced about 75%. And with



higher, more uniform boiler pressure and higher temperature steam, processing units operate at peak efficiency.

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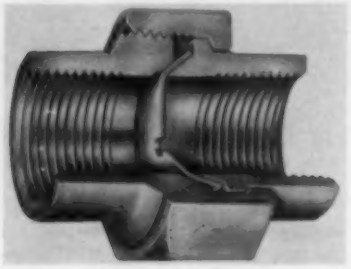
Cup Orifice Union

C-9 Catawissa Cup - Orifice Unions are now being offered by **Catawissa Valve & Fittings Co.**, Catawissa, Pa.

The new product features a cup-shaped stainless steel or carbon steel orifice plate which fits into place between the conventional pipe union



head and tail pieces to form a tight, leakproof seal. The cup-type plate can be used in a standard Catawissa Union to convert it to an orifice union. Separate gaskets are eliminated as is the previous uncertainty of the gasket type needed for specific temperature and pressure requirements.

The new Cup-Orifice Unions are made in ⅛" to 2" pipe sizes, inclusive, with a 3,000 psi pressure rating.

Color Coded Lighting Fixtures

C-10 Wyteliner industrial luminaires by **Edwin F. Guth Company**, 2615 Washington Blvd., St. Louis 3, Missouri, are now available with Kolorkode — color coding facilitating worker movements, eliminating hazards and helping to direct the flow of work.

Red units can be used to identify exists and fire protection equipment; yellow to identify stairs, curbings, dead ends, etc.; green for general aisles, traffic lanes and other safe through-passageways.

The Kolorkoded Guth Wyteliners feature a drop-design end plate and are for 430, 800 or 1500 milliamp operation. The 800 ma units use new "HO" high output lamps. The 1500 ma fixtures utilize "VHO," "SHO" or Power Groove lamps.

Reflector units are offered in white porcelain enamel, baked-on white, or Alzak aluminum. Available with either 10%, or 25% uplight and with 13° or 27° shielding using T-12 lamps.

RETURN LINE CORROSION *Can* BE LICKED!

Drastic reduction of return line corrosion in an easy, effective and economical way has been the unanimous experience of hundreds of plants throughout the country using Bird-Archer's Amine Treatment.

A plant in New York State, generating approximately 500,000 lb. of steam a day, had a normal condensate pH value of 6.3 that resulted in almost constant piping replacements. Only 6 lb. per day of Bird-Archer's Amine Treatment cut maintenance costs to a new low by raising the pH value to the safe range of 8.0 to 8.5.

A plant in New England, generating 600,000 lb. of steam a day, did not have an open feedwater heater which would mechanically eliminate the exceedingly high CO_2 content of their makeup water, consequently, the pH value of their condensate was sometimes as low as 5.9. Less than 12 lb. of Amine Treatment a day raises the pH value of the condensate to 8.5, eliminates excessive corrosion.

After two years of experience with Amine Treatment a power plant in Massachusetts, making 250,000 lb. of steam a day, enthusiastically reports that they eliminate over 75% of their piping replacements through the use of only 2 or 3 lb. a day of Amine Treatment.

Return line corrosion has been licked at these plants. Let a Bird-Archer Service Engineer help you solve *your* corrosion problems.

Write for Bulletin CP100 and the name of the Bird-Archer Service Engineer nearest you.

BA-801

BIRD-ARCHER

WATER TREATING CONSULTANTS

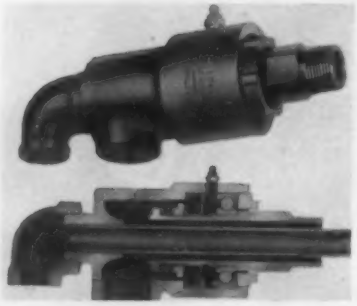
The BIRD-ARCHER Company, 4337 N. American St., Phila. 40, Pa.

New York • Chicago

The BIRD-ARCHER Co. of California, 415 Brannan St., San Francisco

Offices in Canada and Mexico

New Product Briefs (Continued)



Rotary Union

C-11

Designed to handle steam, water, air, vacuum, industrial fluids and gases on applications to 250 psi, 150 psi steam, and temperatures to 500 F without any adjustments, **Perfecting Service Company,** 332 Atando Avenue, Charlotte 6, N. C., announces a newly designed rotary union.

Mechanical sealing is accomplished by two parallel optically flat lapped surfaces running together in an opposite plane in relation to the axis of the shaft.

A new mechanical seal is designed so that pressure is automatically increased or decreased in proportion to the fluid pressure of the application.

Field repair cartridges are available and can be installed in a few minutes using ordinary tools. Unions are available in pipe sizes ¼" thru 3" with right or left hand threads. Bulletin No. 700 gives complete engineering information.

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Power Sweeper

C-12

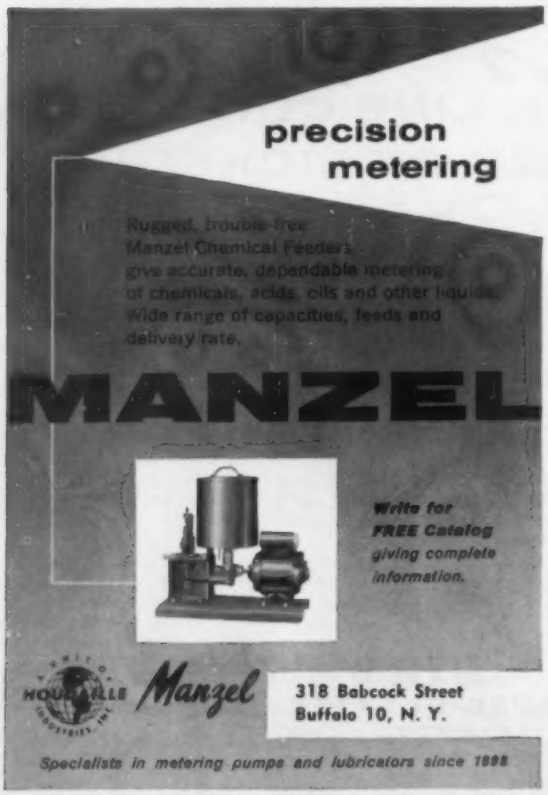
The new Model 703 power sweeper by **Wayne Manufacturing Company,** 1278 East Lexington Avenue, Pomona, California, will sweep in excess of 40,000 sq ft per hour indoors and out.

The sweeper propels itself, the operator merely guides the machine. It is designed for narrow areas and

can turn around completely in its own path.

Sweeper features the patented "filter-vac" dust control system which deposits dust directly into the hopper. It has an optional vacuum hose attachment that combines to make the sweeper two machines in one, a vacuum plus a power sweeper. The Model 703 also will accommodate a sulky attachment to allow the operator to ride while he sweeps.

Sweeping swath without side broom is 30" and with a side broom it is 39". Hopper has a 3 cu ft effective hopper capacity.


precision
metering
Rugged, trouble-free Manzel Chemical Feeders give accurate, dependable metering of chemicals, acids, oils and other liquids. Wide range of capacities, feeds and delivery rate.
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Manzel
318 Babcock Street
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Specialists in metering pumps and lubricators since 1898

match power factor correction to the motor

with *UNIPAK* CAPACITORS*

It's easy with Sprague's *complete selection* of designs in sizes from ½ to 15 KVAR. Each is completely self-contained . . . needs no additional switches or fuses. Unique Sprague unit cell construction gives you maximum reliability, long term trouble-free service.

Write for complete information in Bulletin PF-1150 available free on request to Industrial Capacitor Division, Sprague Electric Co., 49 Marshall St., North Adams, Massachusetts.

The mark of SPRAGUE *reliability*

*Trademark

Double-Seal Ball Valves

C-13 Broad processing uses have been found for the Double-Seal Ball Valve designed and manufactured by the **Jamesbury Corp.**, 95 New St., Worchester, Mass.

A Latex installation includes a 6" valve in a drain line on the bottom of a tank and two 2" valves in a sampling line to hold vacuum while samples are obtained. Pressure in the installation is 28" hg vacuum, and temperature is approximately 90 to 110 F.

A water service installation (illustrated) uses a ¾" valve on 3,000 psi line at ambient temperature.

Air-Line Filter With Throw-Away Cartridge

C-14 Available in sizes ¼", ⅜", ½" and ¾", a new air-line filter by **Perfecting Service Company**, 332 Atando Avenue, Charlotte, N. C., uses an interchangeable "throw-away" type filter cartridge — self-contained cylinders made from helically wound ribbons of phenolic resin impregnated cellulose. They are unaffected by most liquids and gases.

The air enters the filter and passes through a directional flow chamber which creates a cyclonic separating action within the plastic bowl. Dirt, grit, condensate and other foreign matter are automatically separated from the air stream and forced to the bottom of the bowl where it is trapped by a brass baffle. The residue is easily blown out by opening the blow-off valve.

Air, thus cleaned, passes thru the filter cartridge where a second cleansing process removes all remaining particles within a 40 micron rating. Filter cartridges are available in 10, 25 and 40 micron rating.

OSCILLATORS
AIR CIRCULATORS
EXHAUST

FANS

BY EMERSON-ELECTRIC

low initial cost
low operating cost

You save money when you install quiet, efficient fans — oscillators, air circulators and both belt-drive and direct-drive exhaust fans — backed by the Emerson-Electric famous factory-to-user guarantee.

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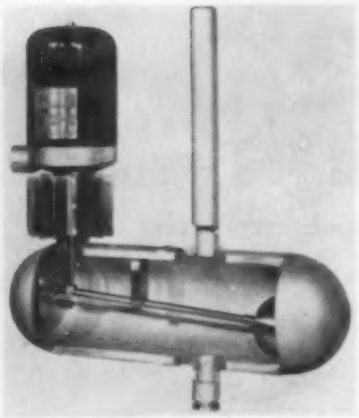
New Product Briefs (Continued)



High Pres.-Temp. Level Controller

C-15 Model 402, an external float cage unit of all welded design by **Magnetrol**, 2118 S. Marshall Blvd., Chicago 23, Ill., is designed especially for high-pressure high-temperature liquid level control applications.

It mounts by means of two beveled welding nipples of one-inch schedule 80 steel pipe. Body is formed from two sections of five-inch schedule 80 seamless alloy steel pipe.

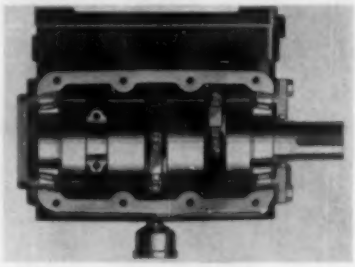
Switch mechanism will operate safely even though liquid temperatures reach 1000 F. Model 402 Magnetrol will operate with liquids of 0.65 specific gravity (at operating temperature) and up.

Temperature-pressure ratings of the new controller are as follows:

TEMP. —F	PSI
—20 to 800	1668
850	1600
900	1455
950	1222
1000	867

Power Pump

C-16 **The Union Steam Pump Company**, Battle Creek, Michigan, recently introduced a new, all purpose Triplex pump known as the TX-10, designed for 10 hp continuous input rating. For intermediate service, the TX-10 is rated to 12½ hp for the equivalent of 10 hours per day. The continuous plunger load rating at normal hp is 1,100 lb but will handle intermediate service up to 1,375 lb.



Its horizontal-type design affords a compact, quiet running, easily-installed power pump. It is available with direct drive to the crankshaft by feed belts, chaindrive, gear motor, or variable drive and for top motor mounting with adjustable mounting plate for horsepower requirements up to 10 hp.

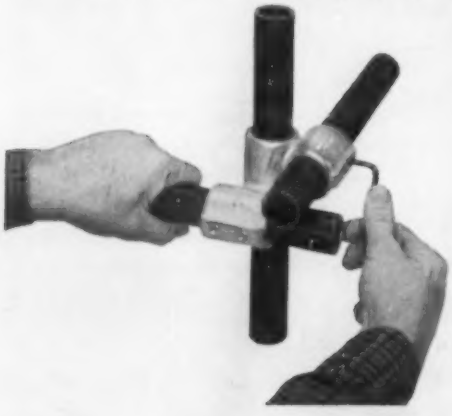
For More Free Data FILL IN CODE NO. on the Handy Return Card — Page 73

You can
BUILD
CHANGE
EXPAND
MOVE
your storage racks with only a
HEX KEY,
HACKSAW
and
RACKMASTER® FITTINGS

RACKMASTER FITTINGS cut rack-building time as much as 60% by eliminating threading and welding. They cut other rack-building costs, too—
- pipe is 100% salvageable
- pipe-cutting is reduced to a minimum
- regular warehouse crews can build racks
- slip-on feature simplifies design and construction

RACKMASTER is stocked by leading distributors. Write for details on Rackmaster and multi-purpose NU-RAIL Fittings Bulletin 175P

THE HOLLAENDER MANUFACTURING CO., 3841 Spring Grove Ave., CINCINNATI 23, O.



Shown above is 3000-cfm VAN-AIR Dryer—the type used by steel, automotive, chemical, container and other plants. Installed in compressor room it purifies and delivers clean, dry air to plant-wide operations. Many other capacities (see below) are also available in the complete line of VAN-AIR

COMPRESSED AIR DRYERS

THAT OPERATE FOR LESS THAN 1-CENT PER 1000 CU. FT.

The VAN-AIR Dryer is automatic. It purifies raw compressed air through a triple-action desiccator that extracts water and dirt—then reduces moisture to zero-dewpoint. It entails no heat, regeneration, volume loss or carry-over—under 1% pressure drop. The clean, dry, "instrument" quality of Van-treated air is indispensable for air controls, tools, processes, etc. as a guard against corrosion, pollution, dilution, freezing, etc.

23 STANDARD CAPACITIES—
25 to 3000 cfm
30 to 6000 psi

PATS. PEND.

Van-Air DRYER

PLANT ENGINEERS! With an eye to efficiency (cost saving, too) look into advantages of dry compressed air. Ask for brochure with dewpoint graphs.

VAN PRODUCTS CO. ★ Engineers ★ Manufacturers

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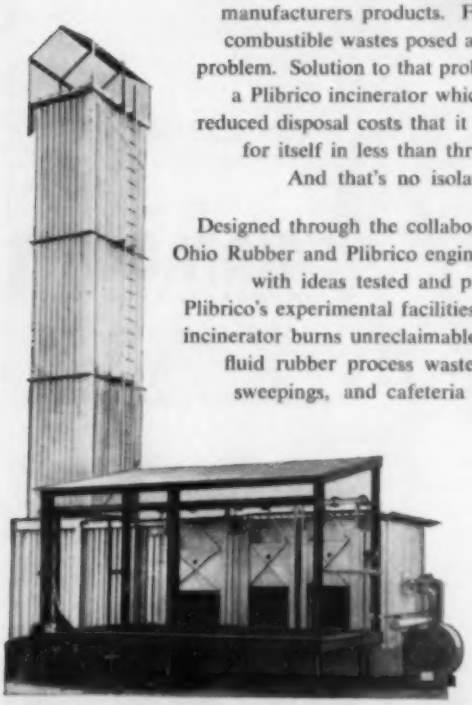
INDUSTRIAL PLANT
burns waste
in a Plibrico INCINERATOR

THE OHIO RUBBER COMPANY

a division of the Eagle-Picher Company, supplies some 2000 extruded and molded rubber parts as components for other manufacturers products. For years, combustible wastes posed a disposal problem. Solution to that problem was a Plibrico incinerator which has so reduced disposal costs that it has paid for itself in less than three years! And that's no isolated case.

Designed through the collaboration of Ohio Rubber and Plibrico engineers . . . with ideas tested and proved in Plibrico's experimental facilities . . . the incinerator burns unreclaimable rubber, fluid rubber process waste, paper, sweepings, and cafeteria garbage.



Whether your waste is as difficult to burn as rubber or as simple as shipping containers, there's an efficiently designed, ruggedly constructed Plibrico incinerator to dispose of it . . . eliminating fire hazards, wasted space, and needless hauling expense.

You can determine the model you need with the handy tables in our complete catalog. Write for a copy, or call your local Plibrico man.

Plibrico INCINERATORS

PLIBRICO COMPANY • CHICAGO 14, ILL.

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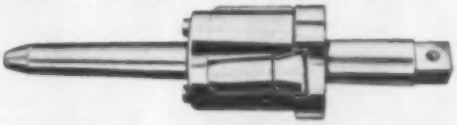
Keep boilers on the line with

WILSON
Maintenance Tools

Heavy-duty air driven tube cleaners

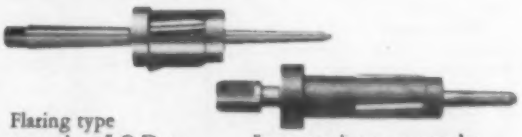
Designed to deliver maximum power at the most efficient cutter head speeds while negotiating sharp bends, the Model ECT Air Cleaners are excellent for cleaning curved boiler tubes from 2½" to 4½" O.D.

Self-feeding tube expanders



Wilson Model 38 tube expanders are self-feeding and parallel expanding. They are of the single flare roll type. Available for tubes 1" O.D. to 4½" O.D. with various roll lengths for tube seats ¾" and up.

Model E Expanders



Flaring type expander 1" O.D. to 4½" O.D. tubes, ½" to 2" tube seats

Long reach type expander 1" O.D. to 4½" O.D. tubes, 2½" to 5" tube seats

Right angle bevel gear drive

This Wilson bevel gear drive is expressly manufactured to meet continuous and heavy duty service conditions. The one piece all steel body is extremely rigid and not subject to distortion. The maintenance of perfect gear alignment is assured with consequent long service life.

Write today for your copies of Wilson Tube Cleaner catalog No. 77 and Wilson Tube Expander catalog No. 88.

Representatives in principal cities
Thomas C. Wilson, Inc. • 21-11 44th Ave., Long Island City 1, N. Y.
Cable address: "Tubeclean", New York

WILSON TW870

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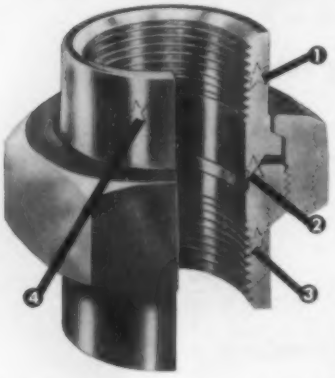
only
CATAWISSA
gives you all these features for your forged steel pipe union requirements



1. **Uniform walls** for even expansion and contraction under temperature changes. They follow the pipe!

2. **Catawissa Ball-to-Angle Seats** give you a "Perfect Seal" regardless of pipe alignment!

3. **More than adequate** wall thicknesses give you Catawissa's 3-to-1 Safety Factor (3000-lb. service, 9000-lb. test; 6000-lb. service, 18000-lb. test)!

4. **Round, straight barrels** for fast wrenching. No uneven or tapered surfaces to cause wrench slips or wrench locking!

Catawissa Perfect Seal Pipe Unions are made by Union Specialists from 80,000 lb. tensile strength steel (ASTM Spec. A-105-55T, Grade II). Steel forgings from our own forging mill are closely checked for imperfections . . . and finishing on modern, automatic machines with close inspection during and after production give you pipe unions second to none!

Write for Catalog 58 showing the complete Catawissa line of Perfect Seal Products.

for complete, guaranteed satisfaction

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New Products (Contd.)

Dust-Tight Valve

C-17 A new dust-tight valve for use with general equipment processing or storing dry solids — called the Solids Flow Valve — has been announced by **The Patterson-Kelley Co., Inc.**, East Stroudsburg, Pa.

The new stainless general-purpose valve is designed for equipment involved in operations where the discharge and flow of dry powders and granulations must be controlled.

Available accessories include special adapters for mounting the new valve to existing equipment — including vessels now equipped with slide valves — a plastic bag adapter, and a positive close-off cover for use on vacuum vessels.

Completely dust-tight, the new valve has been tested with a 20-in. head of water.

The new P-K Solids Flow Valve is available in 8, 10, and 12-inch sizes, with 8¼, 10¼, and 12¼-inch openings and 10½, 12½, and 14¾-inch outside diameters. All valves are 1⅛ inch thick.

For More Free Data FILL IN CODE NO. on the Handy Return Card — Page 73

Boiler Shot Cleaning System

C-18 The **Diamond Power Specialty Corporation**, Lancaster, Ohio, has announced the consummation of a licensing agreement with A. Ekstroms Maskinaffar, of Stockholm, Sweden, covering the Broman-Ekstrom Shot Cleaning System. This system offers improvements in cleaning certain heating surfaces such tubular air-heaters, horizontal superheaters, reheaters and economizers.

Cleaning is accomplished by cascading steel shot uniformly over the heating surface. The shot is recovered and reused indefinitely, being automatically recirculated by a pneumatic system as required.

The Broman-Ekstrom system has been in commercial use since 1949 and more than 800 installations are now in service in 30 countries. Approximately 40 Diamond Shot Cleaning Systems are operating successfully in the difficult service of cleaning recovery boilers that burn black liquor in pulp and paper mill boilers. Several installations are also operating successfully in central stations.

DEOXY-SOL
SOLUTION OF HYDRAZINE

Oxygen-Scavenger for Boiler Water Treatment

FAIRMOUNT
CHEMICAL CO., INC.
136 Liberty St., New York 6, N. Y.
Ask for pamphlet BW

Acid Fumes

(*Starts page* 48)

blades. The new brick flue was constructed to go over the roof of the building adjoining the exhausting area. The inside of the large brick flue is heavily coated with acid resistant material.

New installation has been most satisfactory — no complaints, no troubles and minimum maintenance.

DEPENDABLE
100% AUTOMATIC
REMOTE READING
Tank Contents Gauges

- RELIABLE
- NO POWER REQUIRED
- UNDERWRITERS' APPROVED

Liquidometers use a temperature compensated balanced hydraulic system. Indications unaffected by changes in specific gravity. All models feature large easy-to-read dials. UL approved switches available.

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Southern fabricates and erects a wide variety of stacks, towers, vats, mixing and storage tanks, ducts, penthouses and other special plate work in iron, steel, or stainless steel. Built to customers' specifications. Consulting engineering service is available.
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WHY you are SAFER with MAGNETROL BOILER WATER LEVEL CONTROL

A magnetic sleeve, raised and lowered within a non-magnetic tube, "trips" or releases an Alnico permanent magnet attached to a mercury switch. Basically, this is Magnetrol.

A Few of MANY Reasons:

• Operating Life Is Practically Unlimited
A PERMANENT Alnico magnet, located *outside* the float chamber, links boiler water level and electrical controls. This simpler magnetic link eliminates mechanical parts subject to wear and fatigue failure. *Pioneered and perfected by Magnetrol.*

• Customized Corrosion Control
Floats can be fabricated from a variety of materials to meet any "special" local corrosion problems. Type 304 stainless steel floats have proven over the years to have the greatest all-around corrosion resistance, and so are furnished as standard.

• "No-Scale" Float Chamber Liner
Exclusive self-cleaning brass liner actually "flexes" off corrosion—prevents scale growth and "sticking" of float.

• Up to Three Switches—an Exclusive Safety Feature
Only MAGNETROL design can provide up to three completely separate switch mechanisims, each operating at its own level, in a STANDARD control. Use extra switch for "stand-by" pump for emergency use; or alarm BEFORE fuel cut-off; or high level alarm; etc.

• Least Maintenance
Once-a-shift blow down and once-a-month visual inspection of switch housing are only regular maintenance. *Built SAFE, Magnetrols stay SAFE.*

We offer STANDARD Magnetrol Boiler Water Level Controls for service at temperatures up to 750°F., at pressures up to 600 psi., for single stage or multi-level stage service with up to three separate switching actions. Special units available for more extreme requirements.

MAGNETROL, Inc. Mail the Coupon Now for Full Facts

MAGNETROL, Inc., 2118 S. Marshall Blvd., Chicago 23, Ill. 8
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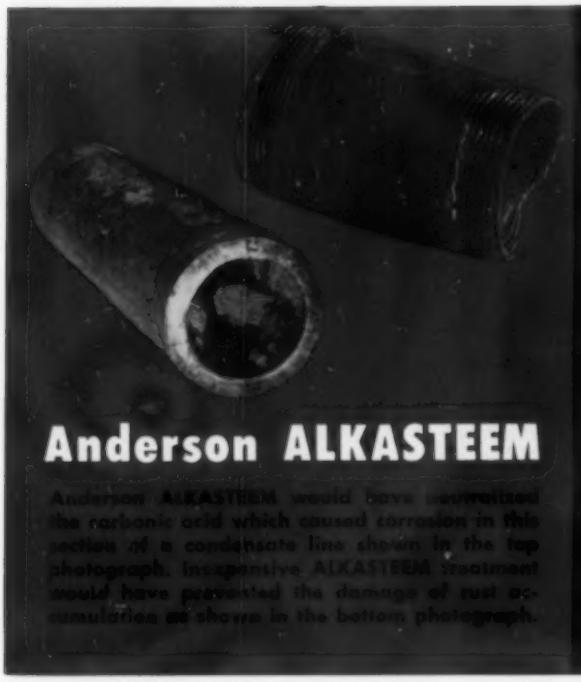
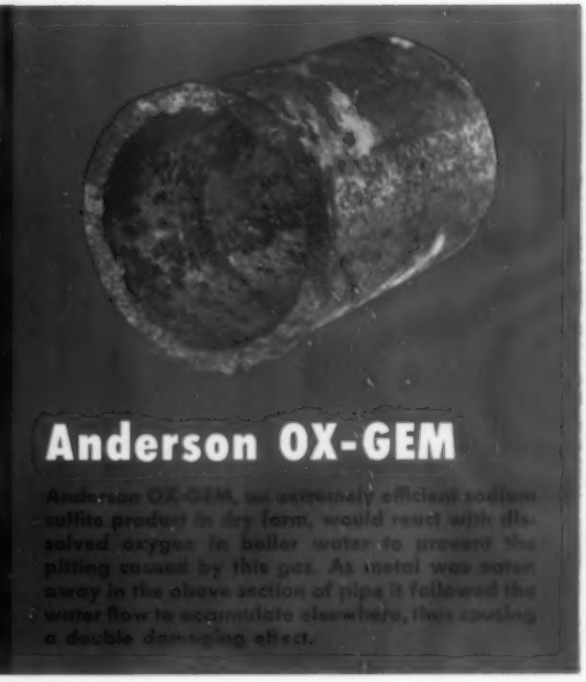
YOU CAN STOP CORROSION

in your boilers, steam lines and condensate lines



Anderson ALKASTEEM

Anderson ALKASTEEM would have neutralized the carbonic acid which caused corrosion in this section of a condensate line shown in the top photograph. Inexpensive ALKASTEEM treatment would have prevented the damage of rust accumulation as shown in the bottom photograph.



Anderson OX-GEM

Anderson OX-GEM, an extremely efficient sodium sulfite product in dry form, would react with dissolved oxygen in boiler water to prevent the pitting caused by this gas. As metal was eaten away in the above section of pipe it followed the water flow to accumulate elsewhere, thus causing a double damaging effect.

You can stop the corrosion at the water line and above it in boilers, steam lines, steam traps, valves, unit heaters and return condensate lines. Corrosion is more frequently caused by dissolved gases such as carbon dioxide and oxygen. When these gases occur in combination the rate of corrosion is greatly increased. If corrosion is allowed to go unchecked the result, of course, is costly shut-downs for repairs and expensive replacements.

Throughout the South, hundreds of engineers rely on Anderson ALKASTEEM and OX-GEM and the counsel of Anderson's field service representatives to check these corrosive gases. The life of equipment is prolonged and the operating efficiency of your water system is increased. The Anderson man is a good man to know.

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Anderson Service Representatives will be glad to discuss your particular water problems and make recommendations based on an analysis of the makeup water. There is an Anderson representative in your area who will gladly work with you. His services cost you nothing. They can save you much.

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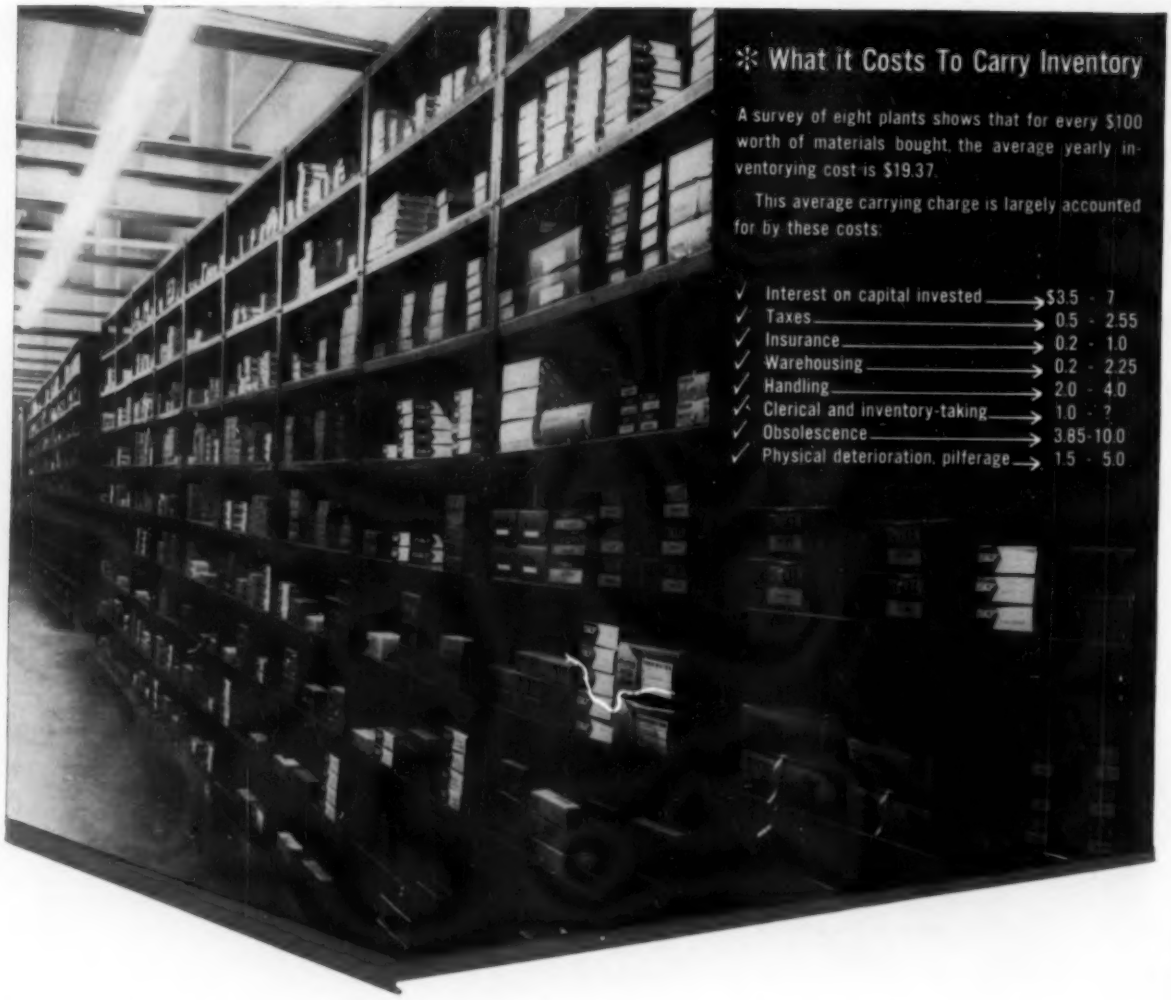
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A survey of eight plants shows that for every $100 worth of materials bought, the average yearly inventorying cost is $19.37.
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